American Fern Journal

A QUARTERLY DEVOTED TO FERNS

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AMERICAN FERN SOCIETY

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RALPH CURTISS BENEDICT, Associate Editor

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Published by Members of the

AMERICAN FERN SOCIETY

CONTENTS

	Page
Foreword	1
Notes on the botrychia	3
Polypodium vulgare in Maine	7
Fern leaves, ferns, and fern allies	9
Notes on some ferns found during 1909	12
Lycopodium inundatum in the White Mountains	15
Of interest to fern students	16

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CONTENTS

No. 1, issued 16 August 1910

Foreword 1
Notes on the botrychia (Plate 1) ..... L. S. HOPKINS 3
Polypodium vulgare in Maine ..... HENRY W. MERRILL 7
Fern leaves, ferns, and fern allies ..... R. C. BENEDICT 9
Notes on some ferns found during 1909 ..... PHILIP DOWELL 12
Lycopodium inundatum in the White Mountains
M. A. MARSHALL 15
Of interest to fern students 16

No. 2, issued 30 December 1910

Fern collecting in Southern California ..... F. T. PEMBER 17
Polypodium vulgare in Great Britain ..... CHAS. T. DRUERY 19
A new hybrid fern ..... E. J. WINSLOW 22
Dryopteris filix-mas × marginalis produced in cultivation
R. C. BENEDICT 24
Polypodium vulgare L. var. auritum Willd. ..... F. G. FLOYD 25
Items for members 28

No. 3, for January, issued 13 February 1911

On the genus Dryopteris ..... CARL CHRISTENSEN 33
Notes on Southern California ferns ..... C. C. KINGMAN 37
A new Cuban fern (Plate 2) ..... R. C. BENEDICT 40
Ferns of the Transvaal [a review] ..... R. C. BENEDICT 44
A fern collector in Florida ..... F. T. PEMBER 45
Fern notes from the South ..... E. L. LEE 49
A collecting trip in southern Florida JOHN DONNELL SMITH 51
On the study of ferns ..... PHILIP DOWELL 53
Notes on ferns attacked by a leaf roller ..... PHILIP DOWELL 58
Ferns at home, and visiting (Plate 3) ..... KATE D. SPALDING 60
Notes and news 63

No. 4, for April, issued 3 May 1911

The Pteridophyta of the arctic regions . CARL CHRISTENSEN 65
A new Antrophyum from Luzon (Plate 4) ..... R. C. BENEDICT 71
Fern collecting in Cuba ..... ELIZABETH G. BRITTON 75
New stations for Dryopteris Goldiana × marginalis in Vermont ..... EZRA BRAINERD 78

Asplenium acrostichoides Sw. ..... E. J. WINSLOW 79
Some Southern California ferns ..... GEORGE L. MOXLEY 82
Notes on the gray polypody ..... STAFFORD C. EDWARDS 83
Review: THE FERNS OF MT. APO ..... R. C. BENEDICT 83
Additions to the herbarium ..... L. S. HOPKINS 85
Notes and news 89

No. 5, for July, issued 7 August 1911

The tropical American species of Dryopteris subgenus Eudryopteris ..... CARL CHRISTENSEN 93
Botrychium Jenmani in Cuba ..... R. C. BENEDICT 98
A new variety of the cinnamon fern .... LEWIS S. HOPKINS 100
A list of the ferns found in the vicinity of Ohio Pyle, Pa. LEWIS S. HOPKINS 101
Southern California fern notes ..... GEORGE L. MOXLEY 104
The study of fossil ferns ..... F. H. KNOWLTON 105
Ferns of the Isthmus of Panama .... GEORGE F. CLEVELAND 111
Cyrus Guernsey Pringle ..... HAROLD GODDARD RUGG 114
The field meeting at Hartford ..... E. J. WINSLOW 115
Notes and news 118

No. 6, for October, issued 29 November 1911

Notes of a naturalist afloat—I (Plate 5) WILLIAM EDWIN SAFFORD 121
Notes on the ferns of the Isle of Pines, West Indies OTTO E. JENNINGS 129
An interesting find ..... HAROLD W. PRETZ 137
Lycopodium flabelliforme ..... E. J. WINSLOW 141
Edward Palmer ..... WILLIAM EDWIN SAFFORD 143
Grace A. Woolson ..... EMILY HITCHCOCK TERRY 148
Notes and news 149
Index to volume I 151

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American Fern Journal

Vol. I AUGUST, 1910 No. 1

FOREWORD

About six months ago, a vote was taken to determine whether the American Fern Society was in favor of owning and publishing its official journal. The poll showed sixty in favor, ten opposed, and ten recorded as indifferent, clearly a strong sentiment in favor of a new journal.

As to the advisability of starting a new journal, there are at least two reasons for such action, from which few members can dissent. First, the probability that the present official organ may be discontinued when it has reached its twentieth volume, or even sooner, as its editor has stated more than once. If such a proceeding is imminent, it is none too soon for the Society to take action, looking toward the starting of a new journal. Secondly, it would be obviously to the advantage of the Society to control and publish its official organ, if it can do so creditably. But (without regard to these considerations,) since the Society requires a journal for its operation, and if it has the means and ability to publish for itself, why should we continue to be dependent upon a yearly contract with a privately owned journal, which contract is liable at the beginning of each year to fail of renewal? Especially when we add that the editorial pages of this privately owned journal are partly devoted to maintaining the editor's views in a controversy upon which the members of the Society are divided, or indifferent, and upon which, therefore, it is policy for the Society to remain neutral.

The undersigned believe that a large proportion of the American Fern Society are in favor of Society ownership, and that such ownership is entirely feasible.

In order to test the matter, to secure reliable data for estimating expenses, and to find out by actual experience what difficulties are to be met and what support can be relied upon, this number has been issued, the expense being shared by a few members who thus act as a voluntary committee of inquiry. If it meets with the approval and support of the members generally, it will be continued as long as support is forthcoming. Already a second issue is practically assured, and copy is plentiful.

Although the action is entirely unofficial, it is intended to make the Journal about what it would be if it were the official publication, publishing news, notes and other matter of interest to the Society, and, as seems proper for a Society paper, personalities will be tabooed, and the editorial department will take a neutral position as to any intra-society controversy. In the matter of nomenclature, each contributor may exercise his preference.

If at any time the Executive Council decides to take it up, the Journal will be turned over to the Society without any expense. In the meantime we ask your support: by contributions in any amount possible; by subscriptions for this number and the next; by suggestions.[1] A full statement of the expenses of this issue, showing what the Society could expect if it owned its journal, will be published in the next number.

(*Signed*) L. S. HOPKINS
H. E. RANSIER
E. J. WINSLOW
R. C. BENEDICT
PHILIP DOWELL
W. C. BARBOUR
NELLIE MIRICK

[1] **Suggestions, subscriptions, and contributions may be sent to Mr. E. J. Winslow, Lasell Seminary, Auburndale, Mass.**

NOTES ON THE BOTRYCHIA

L. S. HOPKINS

(With *Plate I*)

The fern collector who is much in the woods and fields, sooner or later is certain to have the ecological peculiarities of the various species thrust upon him. One species grows upon limestone, another in a swamp, a third on wooded hillsides, and so on throughout the list.

My attention was first called to the clannishness of the botrychia by a friend, Atty. R. J. Webb, of Garrettsville, Ohio, a very careful observer, who, under date of May 14, 1907, wrote: "The most interesting fact revealed by my studies of the botrychia is the remarkable clannishness of the species. They seem to love each other's society and where one grows the others do also.

Botrychium lanceolatum (Gmel.) Ångstr., *Botrychium virginianum* (L.) Sw., and *Botrychium obliquum* Muhl. grow within a few feet or yards of the two stations that I know for *Botrychium ramosum* (Roth.) Aschers. (*Botrychium matricariæfolium* A.Br.). At the other three stations for *Botrychium lanceolatum* (Gmel.) Ångstr., it is in company with *Botrychium virginianum* (L.) Sw. and in one or more cases with *Botrychium obliquum* Muhl."

Since then I have noted many instances of similar association of the various species of botrychia.

Near Troy, Miami Co., Ohio, a group of approximately one hundred plants was seen, including *Botrychium obliquum* Muhl., *Botrychium dissectum* Spreng., as well as several plants intermediate between the two. The plants grew in an open woods within a radius of twenty-five yards.

At Chesterland Caves, Geauga Co., Ohio, *Botrychium*

ramosum (Roth.) Aschers. and *Botrychium lanceolatum* (Gmel.) Ångstr. were seen growing together on July 2, 1908, immediately in front of the hotel at this resort. If any of the other species of botrychia ever grew in the same spot, being larger and more conspicuous, they have been plucked up and exterminated.

Near Burton in the same county, *Botrychium dissectum* Spreng. and *Botrychium obliquum* Muhl. and its varieties (as yet undetermined) grow in a moist, sandy bottom field of four or five acres in such profusion that even a modest estimate would sound almost absurd. Fifty-six plants were counted in a space estimated at twenty feet square. They were almost as numerous in other parts of the field.

A similar grouping was noted in the fall of 1909 near Cheswick, Allegheny Co., Pa. In this instance *Botrychium dissectum* Spreng., *Botrychium obliquum* Muhl., *Botrychium obliquum* v. *oneidense* (Gilbert) Waters and a form very suggestive of the variety *tenuifolium* (Und.) Gilbert were found rather plentifully within a few yards of each other.

The probable explanation of this grouping together of these plants is to be found in the fact that they are rather exacting as to the ecological conditions under which they will grow best, and wherever these conditions obtain the plants are likely to occur rather plentifully.

Curiosity prompted the measurement of the roots of two specimens of *Botrychium virginianum* (L.) Sw. collected near Trafford City, Allegheny Co., Pa., May 28, 1910. The specimens were taken at random from a group of perhaps twenty plants of the same species. In each case a small part of the root system was probably lost since the idea of measuring the roots was not thought of until the plants were being prepared for pressing, and no special care had been used in taking them up. The combined length of the roots of one

Plate I

(About natural size)

plant was 278 inches; of the other 312 inches. The roots were pressed and will be mounted with the plants although every one knows the roots of the botrychia are very brittle and difficult of preservation when dried.

In "The Fern Flora of Ohio" (Fern Bulletin, Jan. 1907) mention was made of the reproduction of the botrychia in some cases at least by a short thick root-stock. Since that time I have found two mature fruiting fronds of *Botrychium ramosum* (Roth.) Aschers., attached to the same rootstock as shown in *Plate I.* Also a specimen of *Botrychium obliquum* Muhl. having two sterile fronds and a bud for a third, all on the same rootstock, was found late last fall at Cheswick, Allegheny Co., Pa.

Although Christensen's "Index Filicum" and other authorities list *Botrychium dissectum* Spreng. as a separate species, it is rather difficult for an amateur to understand why it should be so regarded. Seen by itself on the mounted sheet there is no doubt a very marked difference between the typical *dissectum* and the typical *obliquum;* but when one finds, as any one who cares to look for it may find, the typical forms of *obliquum* and *dissectum* with a complete set of intermediate forms and all growing within a few feet of each other, then the differences do not seem so striking. I have never seen *dissectum* growing except in company with *obliquum* and always with the intermediate forms. If *dissectum* is a valid species, what are the intermediate forms?

PITTSBURGH HIGH SCHOOL,
PITTSBURGH, PA.

POLYPODIUM VULGARE IN MAINE

HENRY W. MERRILL

Maine with its 3,000 miles of rock-bound coast, its many mountains and almost numberless hills, the outcropping ledges that show their granite heads so unexpectedly above its many plains, is an ideal home for the hardy little polypody, that carpets the top of most of the ledges, or hangs gracefully over their brinks, or nestles beneath some evergreen tree, whose branches spread out their protecting arms, and whose fallen needles clothe the ground with a soft mantle, which in time decays and furnishes the rich soil needful for the development of plant life.

A writer in speaking of *Polypodium vulgare* (L.) states that it is not ordinarily a variable fern and that only a few forms have been named.

In a British work, "Choice Ferns," there are thirty-five named forms. Although the old world may be favored with more forms than the new world,—or it may be that our brother botanist across the water is more given to form names than we are,—the number of forms that have been brought to light in this country within the past few years goes far to prove that we have many of them at home and by careful search we may hope to bring many more out from their ledgy homes.

It was but a few years ago that *P. vulgare* v. *auritum* (H. W. Jewell) and *P. vulgare* v. *cambricum* (Miss E. S. Shaw) were the only two forms known in Maine. The former was found at Farmington and the latter was reported from Mount Desert Island.

Some two years ago the writer was fortunate in finding *auritum*, soon to be followed by the discovery of *hastatum*. These finds were not confined to a single station, but were scattered over an extent of many miles, which

seems to be proof conclusive that these forms are to be expected at any station where the type is found. It was, indeed, a red-letter day when the writer found two fronds of what was afterwards determined as *Polypodium vulgare* v. *ovatum* (Moore). The long stipe and rather short blade, the graceful curve of the frond, the long tapering pinnæ, with their sinuate margins, with the background furnished by the mellow sunshine of a September day, formed a picture that will hang for many years on memory's wall.

Among the forms are found *elongata* (H. W. Jewell), *multifidum* (Moore), *ramosum* (Moore), *sinuatum*, with all of the pinnæ sinuate.

A station was found last fall (1909), under the low-spreading limbs of a hemlock, where the sun could only now and then shoot narrow rays of light for a form or freak, that was as "beautifully crisped and ruffled" as the *Polystichum acrostichoides crispum*, and it was with a sigh of regret that the few fronds gathered were placed in the press, for well we knew that the graceful ruffles would be ruined. This form was not confined to a few fronds, but there were hundreds of them, and no frond of the type was found with them.

Perhaps the most interesting find of any form of the species in this state was made last August by Mrs. A. E. Scoullar, at Standish. This proved to be *bifido-cristatum*. Druery describes it as follows: "Long, narrow, robust, crested; its short leaflets are fanned out at the tips into rounded crests, and the frond tip, repeatedly divided, forms a large, flat tassel."

Still another form has been found that, unlike *auritum*, which has ears on the lower side of the pinnæ, has ears on the upper edge of the pinnæ only. Mr. W. N. Clute says that this form is new and the finder is hunting for a name, but so far he has been unsuccessful.

Any one who is a fern enthusiast can spend many

pleasant hours with the polypods and will undoubtedly be rewarded by finding of one or more forms, not mentioning the many freaks that will be constantly appearing before him.

HIRAM, MAINE.

FERN LEAVES, FERNS AND FERN ALLIES

R. C. BENEDICT

The topic would scarcely seem to be one in need of much discussion, but as morphologists and palæobotanists have lately added a good deal to our knowledge of the subject, completely changing some of the old conceptions, a brief resumé will not be out of place.

There has been a large amount written about ferns in the last few years, particularly about their anatomy and evolution,—and consequently about their relationships to other groups of plants, such as the lycopods, equisetes, cycads, flowering plants, etc. Taking pteridophytes as a whole, the number of printed pages devoted to this collection of plants in the last five years is in the thousands,—and this estimate does not include taxonomic literature. Among those who have contributed largely on this topic are Professor Bower of the University of Glasgow, Professor Jeffreys of Harvard, Professor Scott of Cambridge, and Professor Campbell of Leland Stanford.

These and a large number of others have expressed no doubt as to the distinction between leaf and stem in our modern ferns. A fern leaf is a lateral appendage of a fern stem, and has three main characteristics: (1)

It is rolled in a coil in the bud phase; (2) as it unrolls the apex continues to grow; this power of more or less indefinite growth is possessed most remarkably by Lygodium and the Gleicheniaceæ. Campbell refers to leaves of Lygodium which reach a length of one hundred feet, and in the Gleicheniaceæ the leaf apex may continue to unroll for several seasons; (3) fern leaves bear sporangia on the back.

Ferns then are pteridophytes with leaves of the type just described.

Fern allies should be, as the word "allies" implies, related to ferns. Relationship, as ordinarily determined in such cases, depends on (*a*) similarity of structure, and (*b*) actual relationship as shown by study of fossils.

According to structure, lycopods and equisetes, often called "fern allies," are not related to ferns at all. It is necessary only to point to the difference between their leaves and the leaves of ferns, and to the fact that their sporangia are borne either on the upper surface of the leaves, or on the stem itself. The internal anatomy is also different.

Neither according to the geological evidence, do ferns, lycopods, and equisetes show any inter-relationship. In the earliest horizons in which fossils of vascular plants are found these three groups occur, and differ in the same respects as today. This earliest period is estimated to be as much as sixty million years old.

However, a certain group of plants, alive at that time but extinct now, is of especial interest in determining what are fern allies. These were plants with leaves very much like fern leaves, so much so that until recently most of them were believed to be ferns. It has been found, however, that these plants bore seeds on some of the leaves. On other leaves they bore spores, contained in *spore cases* and *fruit-dots*, but these spores were the *pollen grains*.

Because of the many striking resemblances to ferns, it is believed that these "seed ferns," or pteridosperms, as they are called, were directly descended from plants ancestral also to the true ferns. The cycads or "fern palms" of our modern tropics, commonly included in the group *Gymnospermæ,* are generally recognized as descendants of the pteridosperms. This opens up a new line of fern allies, nearer at least than *Equisetum* and *Lycopodium.*

But a still greater line of "allies" will have to be recognized if recent researches of G. R. Wieland on Mexican cycads are confirmed. He has found among certain Mesozoic cycads a type of floral structure so much like certain modern angiospermous types that he has concluded that our common flowering plants must be descended from the cycad-fern line.

No one, however, is likely to include flowering plants under the title of fern allies. This name may be properly applied to three modern groups of plants, viz., the *Ophioglossales*, the *Salviniaceæ* and the *Marsiliaceæ,* the last two groups being often grouped together as the *Hydropterides*, or water ferns, but now believed to be related to separate lines of ferns.

The *Ophioglossales* have given rise to a large amount of discussion as to the exact nature of the fertile spike or panicle. Campbell at one time believed it to be primitive, and suggested that it might show a relationship with the liverwort *Anthoceros.* He has since withdrawn from that position. Bower believes these plants to be related to the *Equisetum* line, in which case they would not be fern allies, of course.

Probably, however, the most generally accepted view regards them as allied to ferns, and a recent paper by Chrysler (Bot. Gaz., **48**: 1909), in which evidence is given to prove that the fertile part represents fused pinnæ, furnishes strong support for this opinion. There

is certainly no justification for comparing the leaves of these plants to the stems, leaves, and flowers of a peony.

It will be seen, then, that a magazine devoted to ferns, lycopods, and equisetes, can hardly be said to be devoted to one group of plants, and this distinction will have to be reserved for the four or five fungus periodicals, and the French bryophyte journal, the *Revue Bryologique*.

COLUMBIA UNIVERSITY.

NOTES ON SOME FERNS FOUND DURING 1909

PHILIP DOWELL

While attending the botanical symposium, at Stamford, New York, during the first week of July, 1909, I was interested chiefly in noting and collecting some of the ferns of the region. Beside the more common ferns and some that are noted further on, I may here mention the following as found in the region: *Phegopteris Dryopteris* (L.) Fée, *P. Phegopteris* (L.) Und., *Filix fragilis* (L). Und., *Matteuccia Struthiopteris* (L.) Todaro, *Dryopteris cristata* x *marginalis* Dav. About midway up Mt. Utsayantha there were á few plants of *Athyrium angustifolium* (Michx.) Milde growing in an open wet place. I did not see this fern elsewhere in the region about Stamford. Near the summit of the mountain there were *Dryopteris Goldiana* (Hook.) Gray, *D. dilatata* (Hoffm.) Gray, and *D. intermedia* (Muhl.) Gray. The two latter grew side by side, and I made a hurried but unsuccessful search for intermediates between them. On the wooded slopes of this mountain and of Bald Hill there were numerous little plants of *Botrychium lanceolatum* (Gmel.) Ångstr. and *B. neglectum* Wood. These

two grew side by side and showed no striking difference in habit and general appearance.

The Clinton fern was not found except in two of the swamps visited, while the crested fern was quite common, especially in the alder swamps. The Clinton fern evidently prefers woodland swamps with larger trees. In such a woodland, in which a small ravine spreads out into a little swamp, I found a few plants of the Clinton fern and also a few plants of the hybrid between this and *Dryopteris intermedia*.

To me the most interesting find in the region was perhaps, that of numerous plants or clumps of *D. cristata* x *spinulosa* (Milde) C. Chr. This was found in several swamps, and quite as abundant as Boott's fern, which was frequent, especially in the alder swamps. Some idea of its growth may be gained if I state that from one clump I removed over twenty fronds, but that no apparent difference in its size was afterwards noticeable.

This fern, *D. cristata* x *spinulosa*, was recorded in Bull. Torrey Club 35: 136. 1908, as having been found at Suffern, N.Y., and in two localities on Staten Island. In Fern Bull. 17 : 35. 1909, E. J. Winslow records it from Barton Landing, Vt., and from Lowman, N.Y. L. S. Hopkins has found a number of specimens of this hybrid in eastern Ohio. During 1909 I found new stations for it at West Nyack, N.Y., and at Metuchen, N.J. However, in the vicinity of New York City it is rare compared to Boott's fern.[1] The latter I have found in nearly all swamps I have visited in which *D. cristata* (L.) Gray and *D. intermedia* were both found. Often it occurs only sparingly, but in some places quite abundantly. Even in places where *D. spinulosa* (Müll.) O. Ktze. is more abundant than *D. intermedia*, it has

[1] Cf. Observations on the Occurrence of Boott's Fern. Torreya 6: 205. 1906. New Ferns Described as Hybrids in the Genus Dryopteris. Bull. Torrey Club 35: 136. 1908.

been found more frequently than *D. cristata* x *spinulosa*. It seems that in this vicinity *D. intermedia* hybridizes more freely than *D. spinulosa*, while farther north the latter hybridizes more freely than here. This is borne out also by the fact that there is a similar proportion of hybrids between these two and the Clinton fern, *D. Clintoniana* x *spinulosa* Benedict being less abundant here than farther north or than the corresponding hybrid with *D. intermedia*.

A new station for *Dryopteris Goldiana* x *marginalis* Dowell was found at Waterloo, N.J., on August 9. Both the putative parents were found abundant along a mountain rill, and after a diligent search I secured a fine plant of the hybrid, bearing four fronds. This plant is now growing nicely in my garden, in a much drier situation than its original home.

Mr. R. C. Benedict sent me a plant of this hybrid from Jamesville, N.Y.,[1] during the first week in July of the year. This also is alive in my garden, side by side with plants from Newton, N.J., the first locality for this hybrid.[2]

In the swamps at Lodi and West Englewood, N.J., there grow side by side the Clinton, the crested and the Goldie ferns, and with them numerous puzzling intermediates. The cross between the Clinton and the Goldie may be reported with confidence, but the others are somewhat doubtful. A few of these puzzling plants have been transplanted at home for further study.

Port Richmond, N.Y.

[1] Torreya 8: 284. 1908.

[2] Bull. Torrey Club 35: 139. 1908.

LYCOPODIUM INUNDATUM IN THE WHITE MOUNTAINS

M. A. MARSHALL

In late August, 1907, a few days were spent at Breezy Point, Warren, N.H., and there, as elsewhere, the flora claimed much attention. No unfamiliar ferns were found, but one day, in walking up the rough mountain road leading from Merrill's Mountain Home to the Summit House on Mt. Moosilauke, a small *Lycopodium* was seen that has been pronounced typical *L. inundatum*. This road is built on the steep mountain side, in many places cut in on the upper side and built up on the lower, with a depression at the bottom of the cut to carry off water. In two hollows of this roadside gutter the little lycopodiums were found,—small weak plants, none over five inches long, clinging closely to the soil, some creeping up the rain-washed bank, most bearing each a sporophyte from an inch to an inch and a half in height. The plants were entirely separate, not more than two dozen in all. The neighborhood produced abundantly black spruce and balsam, *Spirea tomentosa*, *Pteris aquilina*, *Anaphalis margaritacea* and a dry-ground *Solidago*. A few rods away, lower down the mountain, was a carpet of *Lycopodium annotinum*, *L. obscurum*, and *L. clavatum* in intimate mixture, but, so far as observed, nothing justified the presence of an *inundatum* plant in that locality. It will be interesting to make further search for the plant in that neighborhood.

OF INTEREST TO FERN STUDENTS

Extracts from letters from H. E. Ransier

"I am ready to make a distribution of cared walking fern specimens to members,—3 cents postage. Also forking and eared Harts Tongue ferns,—5 cents postage. I will make photo of any deserving specimen, as rare or abnormal form, if sent in tight tin tube or box while fresh, *i.e.*, green, making photo natural size when practical, or such a portion as is of interest, natural size, photo to be available for Society's use. I will make lantern slide, from any good negative, of ferns that may be sent me by any member, one slide to be given the loaner of the negative, the Society to have privilege of using duplicate slides. When sufficient number of slides have been collected the set to be loaned to members upon payment of charges for transportation both ways. Slides can be made from films and plates of any size. Films or plates sent for this purpose will be returned as soon as slides have been made. I will be glad to examine plates that may be considered doubtful and pass upon them. Plates showing environment, as well as individual specimens, solicited." . . .

"I think I forgot to include an offer to furnish Polystichum Lonchitis in my last letter; if so, I now do it. As specimens are good lusty ones, I think postage and packing would be about 5 cents.

"I think you make a mistake in thinking that something new only will be acceptable for exchanges. My experience has been that some of the less rare ones were called for more freely than the rare, and then, too, the active members are not often the oldest collectors."

H. E. RANSIER.

"No *nomina conservanda* for pteridophytes save only *Seloginella*." News from the international botanical congress, recently met at Brussels.

Mr. L. S. Hopkins offers material of three species of *Equisetum* (not *E. arvense* or *E. hiemale*) to members who will send him postage.

Vol. 1 DECEMBER, 1910 No. 2

American Fern Journal

Published by Members of the

AMERICAN FERN SOCIETY

CONTENTS

	Page
FERN COLLECTING IN SOUTHERN CALIFORNIA	17
POLYPODIUM VULGARE IN GREAT BRITAIN	19
A NEW HYBRID FERN	22
DRYOPTERIS FILIX-MAS X MARGINALIS PRODUCED IN CULTIVATION	24
POLYPODIUM VULGARE L. VAR. AURITUM WILLD.	25
ITEMS FOR MEMBERS:	
HERBARIUM EXCHANGE LIST	28
COST OF FIRST NUMBER	31
NOTES	32

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LOWVILLE, N.Y.

American Fern Journal

Vol. 1 DECEMBER, 1910 No. 2

FERN COLLECTING IN SOUTHERN CALIFORNIA

F. T. PEMBER

I have heard people say, after visiting the Golden State, that they expected to collect many ferns while there, but could find none. The ferns are not everywhere common as we see them in the North, and there are but few species, and these are seldom noticed about towns or in the level country, but having spent the whole, or a part, of twenty winters in that section, I have learned where to look for them.

One of the very pretty small ferns likely to be found first of all is the cotton fern, *Notholæna Newberryi* D. C. Eaton. It is rather common among and around big stones and boulders, on the north side of hills of moderate height. It is very silvery in color, and peculiar from the fact that if taken from a press where it has been a year it will at once begin to curl and roll so that after an hour you can hardly get it in good shape again. This fern flourishes in drier places than any other except the bird's-foot fern. This last, *Pellæa ornithopus* Hook., is seen on almost naked rocks or in the dry gravel of former water courses. It seems nowhere plentiful, but I could always secure all the specimens I needed. The small pinnæ are in threes and suggest its name. It is very stiff and wiry, but pretty withal.

[No. 1 of the JOURNAL (1 : 1–16) was issued 16 August, 1910.]

On the north side of hills, or where the soil holds some moisture for half of the year, the collector, searching among rocks and stones and low bushes, is delighted to find and gather the beautiful golden-backed fern, *Gymnopteris triangularis* (Kaulf.) Underw. It is the great desire of amateurs and others to obtain specimens of this species. It is also called the silver-backed fern, and this name fits it as well as any, for the backs of the fronds are silvery at first, changing to all the shades of old gold, and finally becoming quite dark in color.

In similar places with the last, and about as plentiful, is the much larger coffee fern, *Pellæa andromedifolia* (Kaulf.) Fée. They make fine specimens, but when dry, if several are laid together, they seem to interlock so that it is next to impossible to get them apart without breaking off the pinnæ.

This completes the list for most localities, but on the mountain slopes, and along the ravines and cañons which they hold, are acres of *Polypodium Scouleri* H. & G. This is two or three times larger than our own *P. vulgare* L. Sometimes associated with it, or among the shrubbery on the north side of the mountain bases, are large sections covered with the charming *Adiantum Jordani* C. Müll., a maidenhair fern, closely resembling the Venus hair fern, but aside from its rarity, not the equal of our own *Adiantum pedatum* L. of the North and East. Perhaps the greatest prize of all is the lovely lace fern, *Cheilanthes gracillima* D. C. Eaton. This is triangular, a little smaller than the golden-backed, and wonderfully cut up and divided, so that it really suggests the name. I have found it on rocky cañon walls, and on or near the tops of mountains 1,500 to 2,000 feet high.

Along streams in the lower mountain gorges one finds in plenty *Woodwardia spinulosa* Mart. & Gal., a California chain fern. It grows in great clumps four or five

feet high. The winter tourist can secure only sterile fronds, as it does not fruit till midsummer, while all the others are in fruit in February and March.

Almost as beautiful as the lace fern is *Cheilanthes Fendleri* Hook., which I have found mostly at an altitude of 4,000 to 5,000 feet. It is small, with three to five inch fronds. In like localities is a fern three or four times larger, *Polystichum munitum* (Kaulf.) Underw., and also the very small but neat *Polypodium californicum* Kaulf.

This list is small but covers all likely to be found in winter and early spring, and it will take a good many long tramps to find all of these. Possibly the number might be doubled by exploring the higher mountains in summer, and taking trips through the state to the north, where the rainfall is greater and the conditions for fern growth are more favorable.

GRANVILLE, N.Y.

POLYPODIUM VULGARE IN GREAT BRITAIN

CHAS. T. DRUERY, V.M.H., F.L.S.

In the very interesting article by Mr. Henry W. Merrill, in the AMERICAN FERN JOURNAL, I find a reference to the above species in connection with our Choice British Ferns, and would like to point out that the greater number of named varieties here cannot fairly be imputed to a tendency to give more names, but is really due to the fact that the much longer period of investigation into fern variation on this side has naturally resulted in the finding of a greater number of distinct forms worthy of distinct names.

The particular point, however, which strikes me, in

the article, and has struck me in others, is that there does not seem to be the same general impulse in the States as prevails here to collect not merely fronds for herbaria, but specimens of the living plants for cultivation and propagation by spores or otherwise. Here, this is always done, and the result is that practically all the named and distinct forms found figure in not one but all collections of note as growing plants. In this way we are able to judge far better of the character than from merely dried and compressed specimens, apart from the fact that the mere collection of fronds for drying, if the material be scanty, is apt to destroy the plants entirely, instead, as might be done by one plant, propagating and perpetuating them.

Some years ago, I read with pain, in the Fern Bulletin, of the discovery of a single rare specimen, which was at once denuded of its fronds for herbarium specimens, while the finder, not content with this, commissioned a friend to visit the locality in the autumn and obtain the second crop, which almost inevitably meant death to the plant. This, to my mind, is absolute vandalism. Several, indeed most of my own discoveries have been solitary plants, and in every case these have been carefully lifted, swathed in damp moss, and taken home intact, the result being eventually the wide distribution of plants raised from spores or offsets, and the consequent perpetuation of new forms. Mr. Merrill mentions several forms of *Polypodium vulgare* which from the descriptions and names I cannot allocate to known forms here. For instance, he speaks of one of his own finds occupying an extended station, with hundreds of "beautifully crisped and ruffled" fronds, and none of the type, obviously a splendid find. He does not, however, collect a plant or plants for growing, but merely a few fronds for drying, the graceful ruffles of which he regrets would be ruined in the press. A few bits of the rhizome put

into his vasculum might eventually have enriched and displayed their beautiful fronds to innumerable fern lovers, instead of failing entirely to demonstrate their charm to anyone but himself, and that only *in situ*. As I am interested in varieties of any of the species which are common to Britain and the United States, I should be most happy to exchange living specimens of good forms, particularly of *P. vulgare*. Packed in a tin box in damp moss, it travels well, and in this way I should be enabled to compare forms similarly named to our own, but probably not identical with them, as wild finds are rarely exact repeats of others. We have, for instance, several very distinct forms of *cambricum*, some far excelling the old one. Incidentally, I may mention that some years ago, a polydactylous *Lastræa thelypteris* was found in the United States by Mrs. Puffer, and a piece of rhizome was very kindly supplied to me. I have now a large pan of it, polydactylous throughout. Fortunately, as soon as it was well established, one small, very fertile frond appeared, the only one it has produced, and seizing the opportunity, I have raised a batch, most of which are replicas of the parent. A few appear to have reverted, but two or three are beautifully and heavily crested with fine bunch tassels and very handsome, though small as yet.

11 Shaa Road, Acton
London West, England

A NEW HYBRID FERN

E. J. WINSLOW

Dryopteris filix-mas x marginalis hyb. nov.

Crown and scales at the base of the stipe as in the two parent species. Fronds dark green above, considerably paler beneath, bipinnate, usually 70–90 cm. long, 20–25 cm. broad, broadest at the middle or a little above, acuminate; rachis somewhat chaffy throughout; pinnæ narrowly lanceolate, tapering from near the middle to an acuminate point; pinnulæ oblong, the basal ones crenate and somewhat falcate; sori nearer the margin than the midvein, nearer the end than the base of the veinlets to which they are attached; indusia convex, depth of sinus variable.

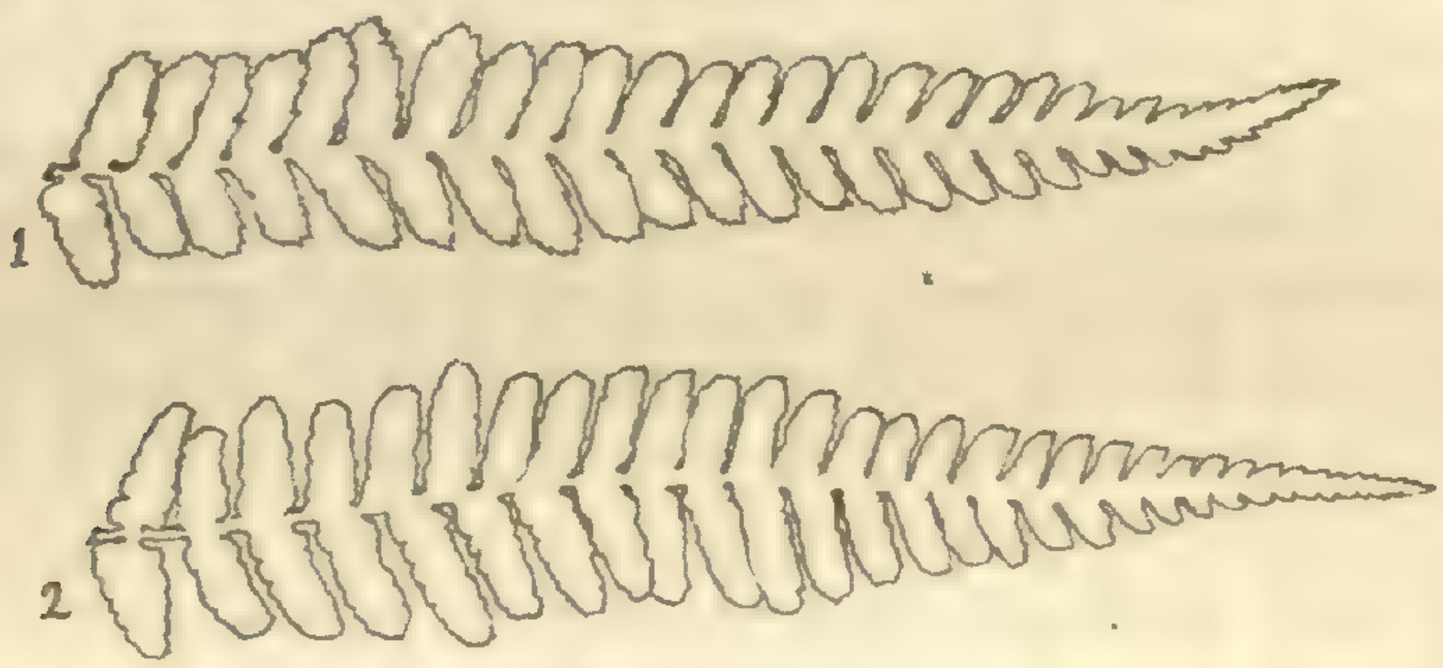
This fern is intermediate between the parent species in color, in outline of the pinnæ and of the pinnulæ, in venation, and in the position of the sori. As far as I have examined, perfect spores are wanting, the sporangia appearing practically empty.

On July 6th of the past summer, I joined a party of fourteen members of the Vermont Botanical Club, on an excursion to North Bridgewater, Vt., to visit the station for *Dryopteris filix-mas*. The party was guided by Miss Nelson, the discoverer of the station. Considering the close relation of the two ferns, I anticipated a hunt for the hybrid, and it was hardly a surprise, though it was a great satisfaction, when I found, almost immediately after alighting from the carriage, first *D. marginalis* and then the hybrid. Several other plants of the hybrid were discovered by members of the party, and though the temptation was considerable, I think none of them was entirely stripped.

Of the five fronds secured by me, I have presented one to the American Fern Society Herbarium, one to the herbarium of the New England Botanical Club, one to the herbarium of the New York Botanical Garden,

and I have two in my collection. Mr. H. G. Rugg has presented material for the Dartmouth College collection, Mr. J. G. Underwood has placed specimens in the collection of the Hartland Nature Club, and others have provided material for the Vermont Botanical Club Herbarium.

The accompanying figures illustrate several points of comparison between a large plant of *D. filix-mas* and



Figs. 1 and 2.—Median pinnæ of *D. filix-mas* and the hybrid (reduced).
Figs. 3 and 4.—Lower pinnulæ from the same (enlarged).

the hybrid. The outlines and position of the fruit are traced from camera projections, the veining was drawn in free hand with the aid of a dissecting lens.

A rather unusual form of what I supposed to be *Dryopteris Clintoniana* x *marginalis* Slosson was found within twenty or thirty feet of my first *filix-mas* hybrid.

AUBURNDALE, MASS.

DRYOPTERIS FILIX-MAS X MARGINALIS PRODUCED IN CULTIVATION

R. C. BENEDICT

As an addendum to Mr. Winslow's description of *Dryopteris filix-mas* x *marginalis*, mention should be made of another plant properly to be identified as this hybrid, which was produced by Mr. Amedée Hans several years ago, and of which a leaf is preserved in the herbarium of the New York Botanical Garden.

The plant was one of many raised from a sowing of a mixture of *filix-mas* and *marginalis* spores, but was the only one of the lot which could not be identified with either one of the species, although suggestive of both in many of its characters, *viz.*, in stipe-scales, in the margin of the pinnulæ, and in the position of the sori. The leaf is somewhat abnormal in that the apices of the blade and pinnæ are all more or less blunted and irregular so that the general outlines of the blade and pinnæ cannot properly be compared to those of Mr. Winslow's plant. The pinnæ, however, appear to be considerably broader than in his specimen.

The sori are very small and the indusia are strongly convex, the margins being closely appressed to the leaf tissue. When examined under a microscope, only small, colorless aborted sporangia were found, although the leaf was collected in September, two or three months after the normal fruiting period of either of the species named.

Some botanists may object to the identification of this plant as a hybrid, because, forsooth, no one is known to have observed the fusion of the sexual cells of *Dryopteris filix-mas* and *D. marginalis*. To them this specimen and many others are hereby referred, with an earnest request for the proper identifications.

COLUMBIA UNIVERSITY

POLYPODIUM VULGARE L. VAR. AURITUM WILLD.

F. G. FLOYD

American fern students seem to differ in regard to their conception of *Polypodium vulgare* L. var. *auritum* Willd.; the characteristic ear-like appendages borne on fronds of that fern, being described as occupying various positions. My attention has been recently called to this matter, by an article in the *American Fern Journal* (Vol. 1, pages 7–9) "*Polypodium vulgare* in Maine," by Henry W. Merrill, where the statement appears that the true var. *auritum* is not eared on the upper side of the segments. On page 8, Mr. Merrill says ,"Still another form has been found that, unlike *auritum*, which has ears on the lower side of the pinnæ, has ears on the upper edge of the pinnæ only. Mr. W. N. Clute says that this form is new, and the finder is hunting for a name, but so far he has been unsuccessful." Mr. Merrill, unfortunately, does not attempt to substantiate his assumption that the true var. *auritum* is not eared on the upper side of the segments and I am unable to conceive what ground he has for this belief.

Polypodium vulgare L. var. *auritum* Willd. is a form found occasionally in New England, easily distinguished from other varieties by the presence of ears or auricles on the lowest segments next to the midrib. These ears or auricles may be borne on the upper border, on the lower border, or on both upper and lower borders of the lowest segments.

Considering the fact that American botanists have only recently evinced active interest in fern variation, it is not surprising that meagre descriptions of these most interesting forms are found in American textbooks, or perhaps no mention of them whatever, and that they are not well understood. For instance, our most pretentious

fern manual contains no description of var. *auritum*, merely referring to it as an "occasional monstrosity."[1] The seventh edition of Gray's Manual, however, accurately but very concisely describes the form in these words: "var. *auritum* Willd., with the lowest segments auricled."[2]

Abroad, however, and particularly in Great Britain, much attention has been given to fern varieties, and considerable specializing has been done in this particularly interesting field. Moore describes the form in these words:

"*auritum* (Willd.). This variety has at the base of the lobes on their anterior side, that is next the rachis on the *upper* margin, a distinct lobule or auricle, forming a kind of ear, from which it takes its name. The auricle is variable in respect to its appearance and size."[3]

The beautiful colored plate (11-*B*) shows a frond auricled only on the anterior side. Mr. E. J. Lowe, another eminent English specialist, describes the form as follows:

"*Auritum*, Moore (Fig. 9) .... The distinguishing peculiarity is an ear-like appendage or lobule, attached sometimes to the anterior, and at other times to the posterior base of the lobes; mostly this distinct auricle is on the anterior base of each of the lower lobes. A small variety, occasionally rather bifid. Outline of the frond normal."[4]

An excellent figure accompanies the description, showing a frond auricled on both anterior and posterior edges of the lowest segments.

Dr. Milde, a pioneer worker in the field of fern variation, has the following description:

---

[1] D. C. Eaton. Ferns of North America. 1: 241.

[2] Robinson & Fernald. Gray's New Manual of Botany. 7th ed., page 34.

[3] Moore. Nature Painted British Ferns. 1: 65.

[4] Lowe. British Ferns. 1: 29.

"Var. *auritum* Willd., P. *auriculatum* Schur. Lower segments, occasionally the upper segments also, auricled on their upper sides or on both sides. . . . . Allied forms exhibit irregularly cut and pinnately lobed segments. . . . . Very often it produces monstrous forms, with the frond forked at the apex or with the segments variously forked and dichotomous."[1]

From these descriptions and figures by eminent fern specialists, it seems apparent to me that Mr. Merrill's fronds of *Polypodium vulgare* L. with "ears on the upper edge of the pinnæ only," are undoubtedly true var. *auritum* Willd. Moore and Lowe particularly emphasized the statement that var. *auritum* is eared on the *anterior* side, on the *upper* margin of the lowest segments or lobes; exactly the form described by Mr. Merrill. That they knew what they were writing about is especially borne out by an examination of the original description of the variety, which (translated) reads as follows: "Lower pinnæ of the frond auriculate on the upper basal portion, auricles lanceolate.—W."[2] If there is any reason why such a form as Mr. Merrill describes should bear another name, I should very much like to have it presented.

To the amateur who finds in America some peculiar form not described in our textbooks, and is tempted to name it, I would add a word of caution. Remember that many forms and varieties have already been described by foreign fern students, and before further burdening nomenclature with new combinations that only increase the difficulties of an intricate problem, remember that the only safe course is to make sure that your supposed peculiar form is not among those already described abroad.

WEST ROXBURY, MASS.

---

[1] Milde. Filices Europæ et Atlantidis, etc., translated from the Latin, page 18.

[2] Willdenow, Sp. Plantarum. **5**: 173. 1810.

ITEMS FOR MEMBERS

Herbarium Exchange List

The following pteridophytes are in the Society's Exchange department. Members wishing to arrange an exchange should write the Curator, stating what they wish and what they have to offer.

(NOTE: The figures at the right indicate the number of specimens at hand. The nomenclature is that of Christensen's Index Filicum as far as this applies.)

Adiantum pedatum L. 5
Asplenium montanum Willd. 4
Asplenium pinnatifidum Nutt. 2
Asplenium platyneuron (L.) Oakes. 10
Asplenium resiliens Kunze 2
(*A. parvulum* Mart. & Gal.)
Asplenium trichomanes L. 10
Asplenium viride Huds. 18
Athyrium acrostichoides (Sw.) Diels 5
(*Aspl. thelypteroides* Michx.)
Athyrium filix femina (L.) Roth 7
(*Aspl. filix-foemina* (L.) Bernh.)
Athyrium angustifolium (Michx.) Moore 8
(*Aspl. angustifolium* Michx.)
Blechnum serrulatum Rich. 1
Botrychium obliquum Mühl. 5
Botrychium simplex Hitchc. 8
Botrychium virginianum (L.) Sw. 6
Camptosorus rhizophyllus (L.) Link 110
Cheilanthes Clevelandi D. C. Eat. 1
Cheilanthes Fendleri Hook. 1
Cystopteris bulbifera (L.) Bernh. 10
(*Filix bulbifera* (L.) Underw.)
Cystopteris fragilis (L.) Bernh. 5
(*Filix fragilis* (L.) Underw.)
Cryptogramma Stelleri (Gmel.) Prantl. 62
(*Pellæa gracilis* Michx.)
Dennstædtia punctilobula (Michx.) Moore 6
(*Dicksonia pilosiuscula* Willd.)
Dryopteris Clintoniana (D. C. Eat.) Dowell . 17
(*Dryopteris cristata* var. *Clintoniana* D. C. Eat.)

Dryopteris Clintoniana x *spinulosa intermedia* Slosson 20
(*Dryopteris Clintoniana* x *intermedia* Dowell)
Dryopteris cristata (L.) Gray 5
Dryopteris cristata x *marginalis* Dav.....5
Dryopteris cristata x *spinulosa intermedia* Slosson 10
(*Dryopteris cristata* x *intermedia* Dowell)
(*Aspidium Boottii* Tuckerman)
Dryopteris filix mas (L.) Schott.....5
Dryopteris Goldiana (Hook.) Gray 5
Dryopteris hexagonoptera (Michx.) C. Chr. ...10
(*Phegopteris hexagonoptera* (Michx.) Fée)
Dryopteris Linnæana C. Chr.....5
(*Phegopteris Dryopteris* Fée)
Dryopteris marginalis (L.) Gray 5
Dryopteris noveboracensis (L.) Gray.....5
Dryopteris phegopteris (L.) C. Chr. 10
(*Phegopteris polypodioides* Fée)
Dryopteris rigida arguta (Kaulf.) Underw.....2
Dryopteris simulata Dav..... .12
Dryopteris spinulosa (Müll.) Kuntze.....10
Dryopteris spinulosa intermedia (Mühl.) Underw.....10
Dryopteris thelypteris (L.) Gray 10
Equisetum arvense L.....5
Equisetum arvense decumbens Meyer 2
Equisetum arvense pseudosilvaticum Milde ..4
Equisetum fluviatile L.....10
Equisetum fluviatile verticillata Döll 5
Equisetum hiemale affine A. A. Eat.....10
Equisetum hiemale intermedium A. A. Eat. ..10
Equisetum littorale Kuhl.....10
Equisetum lævigatum A. Br.....10
Equisetum scirpoides Michx.....1
Equisetum silvaticum L.....5
Equisetum silvaticum capillare Hoffm.....4
Equisetum telmateia Ehrh.....1
Isëtes Engelmanni A. Br 2
Lycopodium adpressum (Chapm.) Lloyd & Underw.....3
Lycopodium alopecuroides L.....2
Lycopodium annotinum L.....2
Lycopodium porophilum Lloyd & Underw.....2

Lycopodium sabinæfolium Willd.....2
Lycopodium sitchense Rupr.....1
Lycopodium lucidulum Michx.....2
Lycopodium tristachyum Pursh.....10
Lygodium palmatum (Bernh.) Sw.....4
Marsilea quadrifolia L.....1
Matteuccia struthiopteris (L.) Todaro.....2
(*Onoclea Struthiopteris* Hoffm.)
Osmunda cinnamomea L.....4
Osmunda Claytoniana L.....10
Osmunda regalis L.....7
Pellæa andromedfolia (Kaulf.) Fée.....1
Pellæa atropurpurea (L.) Link.....10
Pellæa ornithopus Hook.....2
Phyllitis scolopendrium (L.) Newm.....102
(*Scolopendrium vulgare* J. E. Sm.)
Polypodium californicum Kaulf.....7
Polypodium munitum Kaulf.....1
Polypodium polypodioides (L.) Hitchc.....2
(*P. incanum* Sw.)
Polypodium vulgare L.....10
Polystichum acrostichoides (Michx.)Schott.....5
Polystichum acrostichoides incisum Gray.....4
Polystichum lonchitis (L.) Roth.....50
Selaginella Bigelovii Underw.....2
Woodsia alpina (Bolton) Gray.....10
(*W. hyperborea* R. Br.)
Woodsia glabella R. Br.....5
Woodsia ilvensis (L.) R. Br.....51
Woodsia obtusa (Spreng.) Torr.....10
Woodwardia virginica (L.) Sw.....12
(*Anchistea virginica* (L.) Pr.)

L. S. Hopkins, *Curator*
Pittsburgh High School
Lincoln Building
Pittsburgh, Pa.

Cost of First Number of the American Fern Journal

The report as here submitted is not exact but merely approximate. There should be added to the Expenditures a small additional amount for other postage. There may now be added to the Receipts and Balance a considerable amount received as subscriptions subsequent to the appearance of the first number. In the present number, an effort has been made to reduce somewhat the expense for proof corrections. Aside from this and aside from possible future reduction in the initial cost of printing, the expenses of this first number may probably be taken as fairly typical. The use of envelopes instead of wrappers in mailing adds a little to the cost.

With this report as a basis, it would seem that if the Society decides to publish for itself such a journal as the present it can expect to issue roughly from 120 to 140 pages per year besides the Annual Reports. This is merely a tentative conservative estimate. In any event, *there is no apparent reason why the Society cannot publish for itself as cheaply as anyone else can do it.*

Receipts		
Contributed	$31.00	
Advertisements	10.25	
Total		$41.25
Expenditures		
For printing an edition of 500 copies:		
First cost of printing	$31.50	
Author's proof corrections	4.50	
Total		$36.00
For cut of Botrychium		.90
For mailing to 170 members		1.87
Total		$38.77
Balance		
Cash	$2.48	
Reserve copies of Journal (estimated)	25.00	
Total		$27.48

NOTES

Copy for No. 3 of the AMERICAN FERN JOURNAL is in hand and ready for the printer. It will include the following articles:

"On the genus Dryopteris," Carl Christensen;
"California ferns," C. C. Kingman;
"A new Cuban fern," R. C. Benedict;
"A fern collector in Florida," F. T. Pember.

Mr. Christensen has promised to contribute articles from time to time, and suggests as his next a paper on the ferns of the Arctic regions of the world.

The prospects for further numbers of the AMERICAN FERN JOURNAL are dependent on the action of the newly elected Executive Council.

According to the report of the Judge of Elections. Mrs. Nellie F. Flynn, the Executive Council will consist of the following officers for 1911:

PHILIP DOWELL, Ph.D., *President* majority 26
Miss NELLIE MIRICK, *Vice-President* majority 66
L. S. HOPKINS, A.M., *Secretary* majority 26
H. G. RUGG, *Treasurer* . . . . . majority 79

The newly elected Executive Council is in favor of a publication owned by the Society and will probably declare itself in favor of the AMERICAN FERN JOURNAL, but definite action is reserved for the new year, when the new officers enter upon their duties.

Subscription to the AMERICAN FERN JOURNAL, 25 cts. a number; $1.00 a year.

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CONTENTS

On the genus Dryopteris .....CARL CHRISTENSEN 33
Notes on Southern California ferns.....C. C. KINGMAN 37
A new Cuban fern (Plate 2) .....R. C. BENEDICT 40
Ferns of the Transvaal.....R. C. BENEDICT 44
A fern collector in Florida.....F. T. PEMBER 45
Fern notes from the South .....E. L. LEE 49
A collecting trip in southern Florida..JOHN DONNELL SMITH 51
On the study of ferns.....PHILIP DOWELL 53
Notes on ferns attacked by a leaf roller.....PHILIP DOWELL 58
Ferns at home, and visiting (Plate 3)..KATE D. SPALDING 60
Notes and news 63

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American Fern Journal

Vol. 1 JANUARY 1911 No. 3

On the genus Dryopteris

CARL CHRISTENSEN

The genus *Dryopteris* includes, as delimited in my Index Filicum, nearly one thousand species. Like most other genera of ferns, it has reached its greatest degree of development in the tropics; northward it extends to Greenland and Alaska, southward to New Zealand, and it is represented in almost all regions inhabited by ferns, the southernmost part of South America being a marked exception. It is scarcely to be expected that this vast number of species were all derived from the same ancestors, and I have thought it possible, by a detailed examination of a large number of species, to find out whether the species really are all congeneric or not. I believe I have succeeded in solving this question.

While older authors considered a single character, as, for instance, the shape of the sori, indusium, venation, as sufficient for distinguishing genera, we are nowadays inclined to see the best generic characters in the general habit and growth of the species, and it must be granted that by considering these characters the prime ones, we have reached a much more natural arrangement of the ferns than before. The systematic arrangement of Diels, in Engler and Prantl, Natürliche Pflanzenfamilien, followed in my Index Filicum, highly surpasses the sys-

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tem of the Synopsis Filicum of Hooker, but it is by no means equally natural in all points. Diels united into a single genus, *Nephrodium* (now *Dryopteris*), all the species previously referred to *Lastrea*, *Nephrodium*, *Phegopteris*, *Goniopteris*, *Leptogramma*, and *Meniscium*. It is difficult to give a diagnosis of a genus including such different forms; but characters common to all species are the inarticulated stipes, the round or somewhat oblong dorsal sori, which are often covered by reniform indusia, and the never complicated venation. It is true that there is a great uniformity as to these characters, and species showing them must naturally belong together, but the question now arises, whether all these species belong to a single genus or to several natural genera, which together form a tribe, the Dryopterideæ. Many attempts have been made to segregate groups of species as genera; about thirty genera have been described by different authors, but only some few of them have been at any time generally accepted, e. g., *Lastrea*, *Nephrodium*, and *Phegopteris*. *Phegopteris* is even now considered a distinct genus by North American pteridologists. All these genera were founded on single characters, viz., whether indusiate or not, with the veins free or anastomosing, the sori round or oblong; but it must soon become obvious to each student of these ferns that none of the characters mentioned indicates a real affinity between the species placed under the same genus. Considering the species of temperate regions only, *Dryopteris* and *Phegopteris* appear very different, and it has seemed very natural to place our species under two genera. It must, however, be remembered that our species are poor representatives of a group of plants that reaches its highest development within the tropics. It is quite unnatural to found genera on such outlying species alone, in which differential characters have become stable ones, while in the tropical forms these same characters are highly

variable. By examining a series of tropical Dryopterids, we soon find that such a character as the presence or absence of indusia is of no generic value, and even difficult to use as a specific character. A very large number of species, which have been referred to *Phegopteris*, are really indusiate, but the indusia are to be seen only in the very young sori. Moreover, we find very often that two forms, which can scarcely be distinguished by any other character, differ from each other only by the one being indusiate, the other exindusiate, but that, notwithstanding this difference, the two forms are closely related and must be referred to the same genus or even species. Quite the same can be said on the shape of the sori and on the venation, if goniopteroid (i. e., forming a few areolæ) or not. Genera founded on such characters (such as *Phegopteris*, etc.) are, therefore, not groups of related species, as natural genera should be, but may include a number of species that are often of a very remote affinity, e. g., *D. tetragona* and *D. phegopteris*, both sometimes referred to *Phegopteris;* on the other hand, species referred partly to one, partly to another genus, are intimately related, e. g., *D. patens*, often referred to *Lastrea*, and *D. mollis* (*D. parasitica*), which is a *Nephrodium*.

For these reasons I referred in my Index all these different species to a single genus, *Dryopteris*, although I was convinced that the genus ought to be divided into several genera. I could not accept the old genera, but I did not then know how I should divide *Dryopteris* in a natural manner. Since then I have examined thousands of specimens of American Dryopterids, belonging to about three hundred species, and I will try in a monograph, soon to be published, to arrange the species in quite a new manner. I do not intend now to create new genera, but I will divide the genus into provisional subgenera, several of which no doubt are good genera.

but *vestigia terrent*. These groups are not based on a single character, but the species belonging to the same subgenus agree in several respects. The characters used are often apparently very minute and have previously been seldom considered as of any value, but they are, nevertheless, very constant. The best and most constant character is the pubescence, i. e., the type of hairs and scales. I have never found that a species varies as to the kind of pubescence; further, species that agree in other characters correspond exactly in pubescence, not in the more or less dense covering by hairs and scales but in the shape of the hairs and scales. For example, all species belonging to the subgenus *Ctenitis* have always only short, multicellular, articulated hairs and very characteristic toothed scales; those belonging to *Goniopteris* have always stellate or forked hairs, etc.

Sorting the North American species of *Dryopteris* according to my new classification, we have the following subgenera represented north of Mexico:

1. EUDRYOPTERIS (*Dryopteris* proper). Here belong the following species: *D. filix-mas*, *Goldiana*, *Clintoniana*, *cristata*, *marginalis*, *floridana*, *arguta*, *fragrans* (incl. *D. aquilonaris* Maxon), *spinulosa*, and *patula* (*mexicana*).

2. GROUP OF D. OPPOSITA: *D. opposita*, *oregana* (*nevadensis*), *oreopteris*, *noveboracensis*, *simulata*, and *thelypteris*.

3. GROUP OF D. PATENS: *D. patens* (=*D. stipularis* Maxon), *normalis* (=*D. patens* Auctt.), *mollis* (=*D. parasitica*), (Louisiana, Alabama, *Harper no. 130*), and *D. gongylodes* (*unita*).

4. PHEGOPTERIS: *D. phegopteris*, *hexagonoptera*, *Linnæana* (*dryopteris*), and *Robertiana*. (*Phegopteris alpestris* is an *Athyrium*.)

5. CTENITIS: *D. ampla*.

6. GONIOPTERIS: *D. reptans*, *tetragona*.

7. MENISCIUM: *D. reticulata*.

At least two other subgenera, *Glaphyropteris* (*D. decussata* and some few other species) and *Steiropteris* (*D. deltoidea* and five or six others) are represented in tropical America and the recently by me proposed new genus *Stigmatopteris* belongs to the Dryopterideæ. The Old World's species belong partly to the same subgenera, partly to others not represented in America. *Stigmatopteris*, *Goniopteris*, and *Glaphyropteris* are exclusively American.

COPENHAGEN, NOVEMBER, 1910.

Notes on Southern California ferns

C. C. KINGMAN

During the past year, which I have spent in Southern California, I have had opportunities for collecting and studying the western ferns in their native haunts, and I have enjoyed tramping over the mountains and exploring the canyons in search of these interesting plants.

At Pasadena, where I have spent most of my time, the foothills rise directly back of the city, and back of these hills lie the San Gabriel Mountains, a bold range of mountains having an elevation of five thousand feet, with several peaks, such as Mt. Lowe and Mt. Wilson, rising a thousand feet higher. These mountain sides are very steep and are difficult to climb, except by following the trails. On every side the mountains are furrowed by deep canyons, through each of which flows a small mountain stream that descends the canyon in a series of pretty waterfalls and cascades. These canyons are beautiful spots and are a paradise for the botanist, especially in the winter, when everything is fresh and green.

The cool, shady sides of the canyons are the favorite haunts of some of our finest ferns. Here among the damp mosses will be found the California polypody, *Polypodium californicum* Kaulf., which forms a thick

green carpet covering large areas. I have found large fronds of this species that measured nearly eighteen inches long.

Polypodium Scouleri H. & G. is occasionally found here, but it is not common in this part of the state. It closely resembles small forms of *P. californicum*, but differs from that species in its blunter pinnæ, its larger and more numerous sori, and in its more leathery texture.

The golden-back fern, *Gymnogramma triangularis* Kaulf., is everywhere abundant. It is the fern that tourists press and mail in their letters as souvenirs. It flourishes in both sunny and shady places. The back of the frond is covered with a yellow, mealy substance that gives it its golden color. I have collected this fern in all parts of Southern California and last July I found the shriveled fronds of this plant abundant on Catalina Island.

Scarcely less abundant are the Pellæas, or cliff brakes. These ferns grow in a rather dry situation and seem to flourish best on rocky hillsides. *Pellæa andromedifolia* (Kaulf.) Fée is a medium-sized fern with rounded segments. It is very common and may be collected along the sides of the mountain trails and in all the canyons. The bird's-foot cliff brake, *Pellæa ornithopus* Hooker, is less common and grows in clefts of the rocks. Its ultimate segments are oblong and are grouped in threes, which give it the name.

The lace fern, *Cheilanthes californica* (Nutt.) Mett., is the most beautiful of all the smaller ferns. The fronds, which are one to four inches long, are delicately cut into many fine segments. This, too, is a rock-loving species and is frequently found along the trails at an elevation of two thousand feet or more.

Pteris aquilina L. is occasionally found, although it is not as common here as in the eastern states. It often reaches a large size, and sometimes the variety *lanuginosa* is found, with the fronds woolly or tomentose.

The maidenhair ferns are found in damp, shady places, often in springy ground. There are several species, the commonest being *Adiantum emarginatum* Hook., with broad fronds and rounded pinnules. This species matures quite early in the spring and then turns brown. I have collected it at Pasadena and Santa Barbara, and also on Catalina Island, where it is abundant on the hills overlooking the ocean.

I have not found *Adiantum capillus-veneris* (Kaulf.) Fée common at Pasadena, but I have collected fine specimens of it near Santa Barbara. In the Ojai Valley, in Ventura County, I once found a large patch of this fern so thick that I was obliged to tread on hundreds of the plants in order to walk up the canyon. This species differs from *A. emarginatum* in its longer lanceolate fronds and in the more wedgeshaped pinnules, which are more lobed on the upper margin; and it matures later, so that fresh fronds may be gathered late in the summer.

Among the larger ferns is *Aspidium argutum* Kaulf. This is an evergreen fern, resembling *A. marginale* of the eastern states both in form and texture. It is quite common on the shady sides of canyons.

Polystichum munitum (Kaulf.) Und. is one of the finest of our western ferns, and is found in the upper canyons. It resembles the Christmas fern but is much larger in every way, the fronds being two or three feet long and often over six inches in width. I have collected it on the Mt. Wilson trail at an elevation of 4,000 feet. Here, too, I have found *Woodwardia radicans* (L.) Sm., one of the largest of our North American ferns. The magnificent fronds are often nearly as tall as a man and the separate pinnæ are larger than the entire fronds of most of our ferns. As this fern takes kindly to cultivation it has been dug up and carried away, so that one must go out of the beaten path to find it in quantity. It is still quite common in the canyons near Santa Barbara.

In the winter the mountain sides are everywhere covered with *Selaginella rupestris* (L.) Spring. It is more upright and treelike than the eastern form. During a dry spell it appears to die away, but after a shower it immediately revives and becomes green again.

There are several species of *Equisetum*, the commonest being *Equisetum telmateia* Ehrh. The sterile plants resemble *E. arvense* but are twice as large. They may be found all summer near streams.

PASADENA, CAL.

A new Cuban fern

R. C. BENEDICT

(PLATE 2)

The discovery of the North or South Pole has never been of very great interest from the standpoint of botanical science, because there has been no prospect that such exploration would add any knowledge of botanical value. Geographically speaking, the botanically unexplored regions are practically all tropical, and such regions are still rather numerous. They occur principally in connection with high mountain ranges and on large islands. Some of these islands, like Java and Jamaica, are fairly well explored. Java is credited with about 600 species of ferns, and Jamaica has nearly as many, a large number of which are known only from this island.

But there are still several West Indian islands with high mountain ranges as yet only partly known, particularly Hayti, Porto Rico, and Cuba. In Cuba, for example, the highest range on the island, the Sierra Maestra, along the southern coast, has hardly been touched and probably contains a large number of ferns and other plants as yet undescribed.

Another hitherto unvisited Cuban range, the Sierra Nipe, located on the east side of the island, has recently been partially explored by Dr. J. A. Shafer, collecting for the New York Botanical Garden. From preliminary study, it appears that the collections contain a large number of undescribed flowering plants. The ferns have not been studied comprehensively, but in looking over the material of the genera included in the first part of Vol. 16 of the North American Flora, the writer found six species of *Anemia*, one of which is quite distinct from any species described in Mr. W. R. Maxon's monograph of the North American species.

It may be described as follows:

Anemia nipeënsis sp. nov.

Rootstock creeping, dorsiventral, rather slender, less than 2 mm. thick, branching, covered with very slender hairlike brown scales. Leaves in two rows, dimorphic, the sporophyl very attenuate, about 35 cm. long, 3-pinnate, with 3 or 4 pairs of scant involute pinnæ borne above the sterile leaves, the sterile leaves 20-30 cm. long, the petiole up to 20 cm. long, slender, blackish-brown below, paler above, sparsely scaly, the lamina deltoid, acute, 5-8 cm. long, 2.5-5 cm. broad, once pinnate-pinnatifid or even 2-pinnate on the basal pair of pinnæ, the pinnæ oblong to deltoid, rather bluntly acute, the margins somewhat revolute, slightly serrulate, the texture coriaceous and rigid.

Type collected on the Sierra Nipe, along trail Piedra Gorda to Woodfred, Oriente; on serpentine formation, 400-500 meters altitude; *J. A. Shafer, No. 3111,* 8 Dec. 1909. Type deposited in Underwood Fern Herbarium, New York Botanical Garden.

Anemia nipeënsis resembles *A. coriacea* Grisebach in the outline and texture of the sterile portion, but differs from this species in having wholly dimorphic leaves, instead of merely dimorphic pinnæ, as in that species. According to Mr. Maxon's key, it is closest to *A. aurita*

Sw. and *A. portoricensis* Maxon, but it differs strongly from these in the outline and texture of the divisions of the sterile lamina.

The genus *Anemia* is represented in the United States by two species, both of which extend north from tropical America. *A. adiantifolia* (L.) Sw., perhaps the commonest species of the genus, is found throughout the West Indies and in southern Florida. With its highly modified, erect basal pinnæ, it looks at first sight very much like a *Botrychium*. It is much more divided than *A. nipeënsis*. *A. mexicana* Klotsch, which ranges north from Mexico into Texas, is like *A. adiantifolia*, in having the basal pinnæ fertile, but the sterile portion is rather thin and herbaceous, once pinnate, and thus different from either of the other species above described.

The Cuban flora promises to be as rich in fern species as Jamaica, if the number of Anemias native there may be taken as an indication. Mr. Maxon credits twenty-six species of this genus to North America and records nine of these as found in Cuba. Recent collections of the New York Botanical Garden have included seven of these, and have added besides *A. nipeënsis*, *A. aurita* Sw. (either this or undescribed) and another which appears also to be undescribed. Dr. Shafer obtained in Oriente several numbers of the rare *A. coriacea* Griseb., and Mrs. N. L. Britton collected in Pinar del Rio what appears to be *A. speciosa* Presl, although her plant is bipinnate below, and in this respect not in agreement with Mr. Maxon's description of this species.

Thus, accepting twenty-eight as the number of North American species of *Anemia*, twelve of these are now known to occur in Cuba.

COLUMBIA UNIVERSITY.

PLATE 2

ANEMIA NIPEËNSIS Benedict

(Slightly reduced. One pinna, A, x 3.)

Ferns of the Transvaal

R. C. BENEDICT

There appeared in the October number of the South African Journal of Science a paper entitled "The families, genera, and species of *Pteridophyta* of the Transvaal," by Joseph Burtt-Davy and Vicary Gibbs Crawley, both in government service there. The senior author, Mr. Burtt-Davy, is a professional botanist who went to South Africa to take the position of government botanist. At the time of his appointment to that position, he held a position in the United States Department of Agriculture. He was originally from England but came to America as a young man, and before he returned to British soil had become an American citizen and had taken an American wife.

Mr. Crawley was an employee of the Transvaal Audit and Exchequer Department, and thus not a professional botanist, but Mr. Burtt-Davy pays high tribute to his interest and ability in botanical study. He died on board steamer in September, 1909, while bound for home to be married.

The article occupies twenty-eight pages, and includes one hundred and nine species, of which twenty-eight are ferns, i. e., plants of the orders Ophioglossales, Marattiales, Filicales and Marsileales; there is one *Equisetum, E. ramosissimum* Desf., and ten lycopods, six in *Lycopodium* and four in *Selaginella*.

To quote from the text: "In preparing the keys for this paper, use has been made of the descriptions and illustrations in Mr. T. R. Sim's 'The ferns of South Africa.'"

"I am also indebted to Mr. Sim for the identification of my collection of *Pteridophyta*, which he worked out when preparing his paper 'Recent information concerning South African ferns and their distribution,' published

in the Transactions of the South African Philosophical Society **16**: 267-300. 1906."

The Transvaal is an inland province on the east side of South Africa, about two hundred miles in extent each way. At the north it overlaps the Tropic of Capricorn upwards of fifty miles, so that a tropical or semitropical climate would be expected, and for the most part the names of the ferns are in accord with this assumption.

It is not, therefore, very surprising to meet the names of species known to occur almost everywhere in the tropics. Such are *Ophioglossum reticulatum* L., *Aspidium molle* Desv. [Sw.], *Adiantum caudatum* L., *A. capillus-veneris* L., *Pteris longifolia* L., *P. cretica* L., and *Osmunda regalis* L.

But when we find that the list includes species otherwise north temperate, or strictly American, the explanation of so anomalous a distribution appears impossible. In this class are *Ophioglossum vulgatum* L., *Nephrodium thelypteris* Desv. [Strempel], *N. filix-mas* Rich., *Asplenium adiantum-nigrum* L., *Polypodium vulgare* L., *P. incanum* Sw. [=*P. polypodioides* (L.) Hitch.], *Lycopodium clavatum* L., *L. carolinianum* L., and *Selaginella rupestris* Spring.

It may be possible to explain the riddle as partly due to incorrect identification, but not for all. Concerning a few species, there is no question as to the identity.

COLUMBIA UNIVERSITY.

A fern collector in Florida

F. T. PEMBER

It was my pleasure to spend the time from February 15th to April 15th, 1910, in southern Florida. About half of this time I put in on the west coast, in the Manatee country, and the balance at Miami and Palm Beach, on the east side of the state. From the latter

place I made trips into the Everglades and along the line of the Florida Keys

Commencing our search at Bradentown, on the Manatee River, we readily find *Dryopteris patens* (Sw.) Ktze., *D. unita* (L.) Ktze., *Woodwardia areolata* (L.) Moore, *Pteridium aquilinum caudatum* (L.) Kuhn, and *Acrostichum excelsum* Maxon. The last is a giant among ferns, growing mostly in salt or brackish marshes, and so has been called the salt marsh fern. I found stalks of last year's growth nine feet high, with stipes as thick as a man's finger, and single pinnæ a foot long, often thirty pairs of them on a single frond, and very much crowded, with the sporangia covering the entire back of the frond and sometimes on the front also

Woodwardia is abundant but does not fruit till later. *Pteridium aquilinum caudatum* abounds everywhere, and is so well marked that it would deserve specific rank did it not grade insensibly into the typical form farther north. I measured old stalks eight feet high, but in dry places it is mostly under two feet.

In the hammocks and growing on the trunks and large horizontal limbs of oaks, often covering them entirely, is the pretty *Polypodium polypodioides* (L.) Hitch. This flourishes in the rainy season and then dries and shrivels up, like the resurrection plant, and can remain in this condition indefinitely, but revives again with the first moisture. I brought some home that had been dried up for months, but they became bright green, erect and vigorous an hour after being placed in water.

Blechnum serrulatum L. C. Richard, a large, distinctly marked fern, with many long, entire and close-veined pinnæ, I found abundant in all moist places. The common sword fern, *Nephrolepis exaltata* (L.) Schott, so frequent in cultivation, I found here in only two places, but it is most abundant on the east coast. *Phlebodium aureum* (L.) R. Br., a peculiar-looking, large, broad, and

coarsely divided fern, I found both on the ground and on the trunks of palms. I found also *Campyloneuron phyllitidis* (L.) Presl, often called hart's tongue, though very unlike the one found in central New York. It has erect, rigid, undivided leaves, from 2 to 3 feet high and 1 to 4 inches broad. From my experience, I judge it is rare.

The only ferns I saw in Florida that I find in eastern New York are the cinnamon, marsh, and royal ferns. The above complete my list from this locality, except for two or three that I have not identified from the young sterile fronds. A few others are there and could be found later in the season.

On the east coast, near Miami, I found all those mentioned except *Campyloneuron phyllitidis* (L.) Presl, and in abundance four new ones. One of these, *Pteris longifolia* L., has fronds narrower than those of the sword fern. Another *Pteris*, *P. cretica* L., is silvery in color, with extremely narrow, stiff, wiry pinnæ, but retains the shape and horizontal spread of *Pteridium aquilinum*. *Anemia adiantifolia* (L.) Sw., a most beautiful fern of small to medium size, grows on dry coral rock, and has the two lower pinnæ fruiting and lengthened above all the others. I found here *Vittaria lineata* (L.) Sm., the grass fern, the strangest and least fernlike-looking of all. The fronds are about $\frac{1}{8}$ inch wide and from 15 to 36 inches long, as I know, though Underwood says 6 to 18 inches. I found them on trunks of the palmetto only, and sometimes 200 or 300 of the grasslike fronds in a clump. Had I not known of their existence, I would not have collected them for ferns.

Back of Miami, near the Alligator Farm, are acres of *Nephrolepis exaltata* (L.) Schott. The plants are mixed with *Blechnum serrulatum* L. C. Richard and *Pteris cretica* L., and all grow from the ground and none on the palms. At Palm Beach, where they are plentiful, none grow on

the ground but all are high up on tall palmettos. In many places there are dozens of plants to a tree, a circle of them under the fronds of the palm.

The Florida Keys seem unsuited to fern life. I found nothing new and very few indeed of any kind of ferns.

Collecting in Florida has its unpleasant features. Many of its thickets and jungles are almost impenetrable, and it has five species of poisonous snakes which grow very large. On former trips for birds, mammals, and reptiles, I have met many of them.

The small black mosquitoes of the Everglade section bite without the warning song and inject five times the venom that the New Jersey mosquito does. Then there are ticks, chigres, and red bugs, all with a wild desire to get into your flesh.

The first is likely to locate in your back hair, and is half buried before you feel him. He is tougher than leather, and it needs a yoke of oxen to pull him out, and then his head and jaws are left in the flesh.

The red bugs are worst of all, and so small as to be scarcely visible to the naked eye. They do not exactly burrow but so poison and irritate the flesh that it swells up from both sides and covers them, and the man who never learned to scratch before, will acquire the knack at once. They get mostly on the ankles or below the knees, and after April 1st it is safer and wiser, after every trip through grass or bushes for specimens, to bathe in sal soda solution as strong as it can be made.

Such things annoy one at the time, but are a source of amusement afterwards, and we always feel the desire of making the journey again even if we have the same experience.

GRANVILLE, N. Y.

Fern notes from the South

E. L. LEE*

Dr. E. L. Lee, of Bridgeport, Ala., in writing to the secretary, has imparted information in regard to two of our most interesting ferns, that seems of sufficient importance to warrant its publication in the JOURNAL. With some slight alterations and omissions, the letters are given below:

Under date of November 21, 1910, Dr. Lee writes:

"Referring to your request and my promises of some months ago, I am sorry to say that I will fall short of my expectations and desires.

"In the spring we had the most destructive forest fire that has swept our mountains in years. The crowns of the ferns were so burnt that many of them were entirely destroyed. My knowledge of this is based upon a somewhat limited area where we spend a portion of the summer and where the ferns have been observed over a period covering several years.

"Another surprise to me was the complete disappearance of *Asplenium Bradleyi* Eat. and *A. pinnatifidum* Nutt. However, I do not believe the forest fires had anything to do with their disappearance. This particular colony was directly under our own home, where I had good opportunities to observe them.

"Last year we did not go to the mountains. This year we did, and found the entire colony of both *A. Bradleyi* and *A. pinnatifidum* had completely disappeared. The colony was not robbed, for no one here knew of them but myself. Dr. Charles Mohr, our former State Botanist, reports them small and insignificant. Are they degenerating and disappearing, or is this merely the tragedy of a community?

"We had hoped to visit other cliffs of the same range,

*Sent by L. S. Hopkins for publication.

N.Y. Bot. Garden
1912

but seventy-one years and rheumatism are sufficient to dampen somewhat the enthusiasm of even a fern student."

Writing further, under date of December 21, 1910, Dr. Lee continues:

"I will take up one by one your questions as to when the fires occurred, over what range of territory they extended, where the stations are from which the ferns disappeared, etc.:

"The fires occurred last March. This month was a record breaker in the South for light rainfall and for the bright, sunny days that prepared the mountains for such destructive fires.

"If you will take a good map of Tennessee and trace the Cumberland Mountains and Walden's Ridge (a parallel range) with the little valley of the Seguatchee between, you will have the field of our forest fire.

"A geological map will show this quicker, as the coal field represents the mountains. Page 116 of Safford and Killebrew's little Geology of Tennessee will show you the situation at a glance.

"Would say this field is about thirty-five miles wide and extends entirely across the state in a northeasterly direction, 125 to 150 miles long. We are just on the line between Tennessee and Alabama and 30 miles west of Chattanooga, the southern extremity of it.

"The stations for *A. Bradleyi* and *A. pinnatifidum* with which I am acquainted are near Bridgeport, on one of the spurs of the Cumberland. We have a little summer home there and the stations are near it.

"My period of observation has extended over ten years. The ferns seemingly grew out of the bare face of the cliffs and overhanging rocks from two or three to fifteen feet high.

"That particular locality is all I have examined, but was led to believe they follow the mountains for about 100 miles farther. Dr. Mohr reports them in the adjoin-

ing county, ending in Clay County. The query with me is, are they moving the line of their limit up a little? Dr. Mohr reports all of these plants as very small.

"The wood ferns suffered most from the fire. Where they grew in profusion some three or four years ago, there are now only a few scattered plants left, and they were not mature when we were in the mountains in August.

"The intensity of the fire is shown by the fact that where the timber had been cut away and two or three tops had fallen together, I found there mountain stones burned till they fell to pieces, and where a stump had burned out the rocks looked as though a house had burned down on them."

BRIDGEPORT, ALA.

A collecting trip in southern Florida*

JOHN DONNELL SMITH

The thirty-two years that have gone by since Austin and I made our moss-hunting trip to South Florida seems to have left me with a poor recollection of its incidents, whether scientific or personal.

At that time the geography of the region bordering the upper Caloosahatchie River was imperfectly understood, and its botany was, of course, even less known. In fact, it was then supposed that the river has its rise in Lake Okeechobee, and I expected to pass by boat into the big lake and there do most of our botanizing. It was not until the following year that it was discovered that a pine barren ridge separated Lake Flirt from Lake Okeechobee.

*A letter received by Mrs. N. L. Britton, in reply to a request for information regarding a collecting trip made by Coe F. Austin and John Donnell Smith, in 1878.

For several years previously I had been in active correspondence with that eminent bryologist, Coe F. Austin, but had not known him personally. I had been a purveyor to him of much material of Musci and Hepaticæ, and was indebted to him for many critical determinations. At my invitation, he joined me at Cedar Keys, Florida, in March, 1878. In a good-sized sail boat of slight draft of water, and with a man to cook and help, we sailed down the gulf coast, chiefly keeping inside of the islands and reefs, and landing frequently to collect. In Charlotte Harbour, Pine Island was our headquarters, and its shell mounds presented an interesing and novel moss flora.

When the Caloosahatchie River became too narrow for sailing, we secured a whitehall sixteen-foot rowboat, and thus completed our ascent of some ninety miles up to Lake Flirt. At that season nearly the whole region was under water, and it was often difficult to find a dry spot for pitching our little tent. Much of the collecting was done while wading up to the knee or even higher. On one such wading trip we came across *Ophioglossum palmatum* L., and it was not until we had access to current literature that we learned we were not its first discoverers outside of the tropics. That very month Dr. A. W. Chapman was publishing in the Botanical Gazette its occurrence on the banks of the Caloosahatchie River. Here, too, in extensive mats on the surface of stagnant water, we met with *Wolfiella floridana* (Donn. Sm.) Thompson. The new or little known mosses were in the following years described by Austin in the Bulletin of the Torrrey Botanical Club.

You are better qualified than I am to appreciate the importance of our collections during this expedition and the value of Austin's scientific work. But I can certify to his enthusiastic enjoyment of this his introduction to

a semitropical world, and to my own unqualified enjoyment of his society.

BALTIMORE, MD., 31 DECEMBER, 1910.

On the study of ferns

PHILIP DOWELL

A few suggestions and occasional reflections on the study of ferns are here presented for the consideration of the reader in the hope that they may be of help to some and of interest to others.

The particular course of plant study to be pursued, like our calling in life, need not be hastily decided on. That will depend largely on circumstances and individual bent and capacity, and need not even be considered at the outset. Some of the most noted botanists have begun by simply going afield and enjoying nature. By constantly associating with plants they have become interested in them and more or less acquainted with them, and later they have become more deeply interested in some special line of plant study.

In order that the student may arrive at the safest conclusions and secure the best results in the study of ferns, he should be acquainted with the plant as it appears in its natural state. Field study should be pursued side by side with the other lines of fern study, whether we emphasize the taxonomic, morphologic, physiologic, pathologic, ecologic, economic, or other phase. When the student is acquainted with the plant as it grows in its natural surroundings, he can to more purpose study its behavior in the laboratory, or elsewhere outside of its natural state and under changed conditions. He can also with more certainty determine the natural relation-

ship of the plant as compared with closely related p'ants.

One illustration suggests itself for consideration at this point. Numerous unsuccessful attempts were made recently to cross *Dryopteris noveboracensis* (L.) Gray with *D. thelypteris* (L.) Gray, and as a result doubt was cast on the existence of fern hybrids in nature.* These experiments go far toward showing how great is the difficulty attending the attempt to produce hybrids among ferns artificially or experimentally. On the other hand, the fact that Dr. Hoyt did not succeed in crossing two species from which hybrid plants have been actually produced experimentally, by Miss Margaret Slosson,† rather detracts from the value of his experiments as a basis for authoritative conclusions. A little more field study might have suggested the probable futility of trying to induce two species of ferns to cross under adverse conditions when they have not been found to do so in their more healthy natural state, without first succeeding in crossing species of which the hybrids have been found actually produced in nature, and even experimentally in the laboratory.

It is not safe to confine observations and conclusions to material preserved in jars, on microscope slides, nor elsewhere, nor to plants growing under abnormal conditions away from their natural surroundings, nor to any one single phase of the problem that presents itself; but the study of such material should be carried on side by side with the study of live material growing in its natural state, and the particular phase of the problem should be viewed parallel with other problems of plant study. The best place to study our native ferns is in their natural habitat, where they are found growing wild. When it is

* W. D. Hoyt. Physiological Aspects of Fertilization and Hybridization in Ferns. Bot. Gaz. **49**: 340. 17 May 1910.

† Bull. Torrey Club **29**: 487. 3 Au 1902.

impracticable to study a plant in its natural habitat, the plant should be transplanted to a more accessible place, where it may be observed repeatedly. This place should have as nearly as possible the same conditions under which the plant grew in nature. It must not differ too much, for if the change in surroundings and conditions of growth is too great, the plant may not behave under the observer's care as it would while growing in its more natural state.

Except in the case of many of the rock ferns, our native ferns in general usually thrive well when transplanted into proper soil in the garden, not too much exposed to the midday sun. Out of about one hundred and fifty fern plants, about forty five of them hybrids, thus transplanted into a small city lot from various places in the vicinity of New York, some of the evergreen wood ferns have grown thus for six seasons. None of the transplanted ferns have died of their own accord except the silvery spleenwort, the Clayton fern, *Lygodium*, and most of the rock ferns. Some of the common ferns spread from the rootstock so rapidly that it is difficult to get rid of them after they become established, such as the sensitive fern, the lady fern, and especially the New York fern and the hay-scented fern. The chief difficulty in transplanting has been to get sufficient shade to reproduce natural conditions. As a consequence some of the more exposed plants have shown a tendency to produce wider and more full leaves toward the end of summer than at the beginning, making the divisions of the leaves appear more crowded in the later than in the earlier leaves. In the case of some of the plants the tendency has been toward a more or less permanent change in this direction. Thus plants of *Dryopteris cristata* (L.) Gray transplanted from shade have become more like those growing naturally in the open. It may be added that *Dryopteris* plants have usually not developed a robust and vigorous growth

before the third season after having been transplanted. This is probably due largely to injuries sustained in the transplanting rather than to the change in conditions.

Spores may be sown and the development and growth of the plant observed from the prothallium up, afield if practicable, otherwise under as natural conditions as possible elsewhere. In a small city lot the supply of plant food is rather small in proportion to the demand, and so it is difficult to raise young plants and preserve them from hungry vermin.

This field work, with the transplanting and raising of plants, is important in all lines of fern study, to the morphologist, physiologist, pathologist, and perhaps more especially to the horticulturist, ecologist, and systematic pteridologist. It is especially helpful in solving problems in connection with the range of variation and behavior of plants under various conditions, and problems of identity and relationship involving the determination whether a particular plant is a form, mutant, variety, species, or a hybrid. When a plant is found that cannot at once be definitely assigned to some known species, its place of growth should be carefully noted, so that the plant may be visited and its characters noted from time to time while it is still growing afield if that be practicable, otherwise the plant should be moved to a more easily accessible place. After having noted the characters of the plant at different times through a season or two, the observer can usually reach a fairly safe conclusion in regard to the identity and relationship of the plant.

For the purpose of becoming acquainted with the plant and for purposes of ready reference and permanent records, the collecting of herbarium specimens is a great help, provided care is taken to collect enough representative material and to dry it in such a way that it will preserve the natural character of the plant as nearly as possible.

Such a specimen, if accompanied by full data regarding its place of growth, when collected, etc., will serve to aid the student in recalling and fixing in mind many points of interest that might otherwise be readily forgotten. When a fern is transplanted a part of the plant may usually be made into a herbarium specimen and thus a permanent record preserved.

As for the name of the plant, that need not seriously worry the student, since the specimen may be designated by a number, at least to begin with, and the name can be supplied when wanted. The scientific names, which to the outsider and to the beginner at first seem so long and difficult, may become as easy and familiar as those of our friends. Besides, the main object is not to find the name of the plant, but to find out something about the plant itself, its conditions of growth, and its relationship to other plants. To name the plant is not systematic botany, as has been so often claimed by those who are afraid of these scientific names, and who consider it too troublesome to go afield or to bother with collecting herbarium specimens. But just why it would be more difficult to remember and refer to *Polypodium vulgare* than to *number one thousand three hundred and twenty-eight*, or to *Polypodium number seven hundred and fifty-seven*, perhaps some one can tell us who advocates the use of numbers instead of scientific names.

Let us not stand aloof and view the mountain at a distance, dreading the labor of the climb, but let us go on and up, enjoying the climb and the broader and more commanding view from the crest. We may study the plant with a view to finding out what we can about its structure, gross and microscopic, its development and growth, how it is nourished, what substances it uses for foods and what substances are harmful to it, what diseases or insect enemies it may be subjected to, how it may be transplanted and propagated to advantage, how

it varies in size, color, habit, etc., according to changing conditions, how it is related to other plants and how it may be classified, etc. Or we may pursue any one of these lines more thoroughly than the others, and this to the best advantage when we do not neglect the living plant in its natural state.

Broadly speaking, each branch of botany, or each line of plant study, is as important, progressive, and productive of knowledge and intellectual development as any other; whether we study the plant from the economic standpoint, how it may minister to our wants or otherwise affect our welfare, and how we may modify its conditions of growth, improving the good and destroying the bad; or from the purely scientific point of view, study its structure, growth and behavior under various conditions, the development and functions of its organs and tissues, its relation to environment, and the relation of the plant in these respects to other plants and its position in the systematic classification of plants; or from the point of view of education and culture, aim to develop a more intelligent, broader and better view of life.

PORT RICHMOND, N. Y.

Notes on ferns attacked by a leaf roller

PHILIP DOWELL

The fern student has no doubt noticed occasional fronds rolled up and drawn together at the tip. On closer examination he has found that a fine web has been spun, holding the parts together, and that the ball or nest thus formed is the home of a small larva. The attacks of this larva were especially noticeable during the summer of 1908, and have not been so noticeable during the past two years.

On October 10, 1908, at a meeting of the Section of

Biology of the Staten Island Association of Arts and Sciences, the writer commented on the attacks of this larva, and recorded comments in the Proceedings of the Section of Biology as follows:*

"The ferns were more than usually attacked by a leaf-rolling insect, the larva of which had destroyed the tips of many of the fronds especially of the Christmas fern and various species of *Dryopteris*. The larva was determined by Dr. H. G. Dyar, of the U. S. National Museum, as a pyralid (*Pyrausta* sp.). This attack on the tips of the fern fronds has also been noticed by Mr. Harold W. Pretz, of Allentown, Pa., and commented on in a letter (Aug. 28 [1908]), in which he said: 'Our ferns near home are in poor condition from the attacks of some larva. *D. cristata* × *marginalis* has suffered very much.' It might be added here that the attacks of the larva were made chiefly during the early part of the season."

The same thing had been noticed by Mr. William R. Maxon and was recorded in the same proceedings† for the meeting of the Section of Biology on December 12, 1908, at which meeting he was present, and "mentioned the fact that he had noticed the fronds of *Dryopteris simulata* Dav. in Maryland attacked by an insect, which had spun a fine web and drawn the pinnæ of the tips together."

*Proc. Staten Island Assoc. 2: 170. 18 Au 1910.

†Loc. cit. 2: 172. 18 Au 1910.

Ferns at home and visiting

KATE D. SPALDING

(PLATE 3)

In the course of a short walk one summer day, I found seven different kinds of ferns and picked a frond from each plant just for the love of them. A friend, seeing them, exclaimed, "They all look alike to me!" It hardly seems possible that a person having eyes should see so little of beauty around him.

There is no more fascinating study for the amateur botanist than ferns, especially if he lives in a locality where they are abundant. Everyone admires their graceful beauty. After having been familiar with their forms all of one's life, it is most interesting to learn to call these neighbors by their names. The widespread popularity of nature study has opened our eyes to many things hitherto unnoticed. If one has a hobby, that hobby is a source of pleasure wherever one goes, and keeps one young. Rue the day when you cease to be absorbingly interested in some specialty.

The first visit to the woods after one has begun to learn more about the growing things will be different from any other trip. I well remember such an occasion. It was on a late September afternoon when the summer's growth was finished. Overhead arched magnificent trees, while the rays of the setting sun cast a golden glow over all. Ferns on every side! Rocks and mounds entirely concealed by the walking fern and big bunches of the cinnamon, spinulose, and other large ferns, often named brakes by the uninitiated, while from the crevices of the rock formation at our feet peeped out rosettes of the dainty maidenhair spleenwort. That student is fortunate who has the woods of New York State or Vermont for his fern textbook.

But one need not depend on going to the often distant

A FERN CORNER.

woods in order to enjoy a sight of ferns. Ferns are ornamental in a suitable corner of the garden and will repay the labor expended upon them many times over in the pleasure they give. A fern cannot be transplanted to any place but will take kindly to civilization if it has plenty of shade, moisture, and good soil. First of all, it is necessary to prepare the bed carefully. Dig out the space required at least two feet and fill in with rich loam or preferably with leaf mold from near-by woods if possible, at least have a top dressing of soil from the woods.

A certain fernery was planted, quite successfully, with three divisions, a swamp, a plain, and a hillside in miniature. The swamp was contrived from a box sunk into the ground and partly filled with loam and moss. Here were planted such ferns as lived in wet places and the box was filled with water twice a day. Over the edge drooped the lovely royal fern (*Osmunda regalis*) and near by lived the sensitive fern (*Onoclea sensibilis*), while in the box were planted the marsh shield fern and the chain ferns.

By far the greater variety of ferns was found in the next division, which was arranged as much as possible like the natural woods, with rocks and logs and leaf mold. Sturdiest among them, and even crowding its neighbors, was the ostrich fern (*Matteuccia struthiopteris*) with its graceful vaselike formation. In the background towered taller ferns, the Goldie (*Dryopteris Goldiana*) and the Clinton (*Dryopteris Clintoniana*), both of which ferns had flourished for many years far from their native wood and had been retransplanted to this garden. The cinnamon fern (*Osmunda cinnamomea*) always did well, sending up more large woolly croziers each spring. The marginal (*Dryopteris marginalis*) and the spinulose (*Dryopteris spinulosa*) together with the Christmas fern (*Polystichum acrostichoides*) gave an evergreen touch to the bed. The narrow-leaved spleenwort (*Athyrium angustifolium*) and the interrupted fern (*Osmunda Claytoniana*) also flour-

ished, but the delicate oak fern (*Phegopteris dryopteris*) did not take so kindly to transplanting. The crested fern (*Dryopteris cristata*) and the maidenhair (*Adiantum pedatum*) made good growth while the lady fern (*Athyrium filix-femina*) grew rank in sunshine or shade. These ferns with others formed a mass of luxuriant foliage from early spring until the frost came. During the winter a covering of leaves was laid over the bed and in spring only a part of the dressing was removed, thus giving the woods corner a more natural look, besides adding in time to the fertility of the soil. Altogether, considering the small space used and the little care required after the first labor, only a good watering each day, that corner gave the owner more enjoyment and satisfaction than any other part of the garden.

At the farther side of the fern bed was built a rockery where ferns requiring little soil could imagine themselves clinging to their native hillsides. These ferns showed more homesickness than the others, but still did survive. Of course the bulblet bladder fern (*Filix bulbifera*) grew everywhere and with its lacy fronds covered up the bare places, while its sister, the fragile bladder fern was the beauty of the early spring. The purple cliff brake (*Pellæa atropurpurea*) showed itself hardy under new conditions and the maidenhair spleenwort (*Asplenium trichomanes*) grew to quite a large size. The Woodsias did fairly well but the ebony spleenwort (*Asplenium platyneuron*) and the walking fern (*Camptosorus rhizophyllus*) grew very slowly.

The primary object of this particular fernery was not so much a beauty spot as a collection of as many varieties of ferns as possible in small space, but it could not help being a beauty spot just the same. If one does not live in a locality where many kinds of ferns are found, there are dealers who make a specialty of supplying them. If a fernery is chiefly to beautify the garden, a selection of

larger ferns, such as grew in the middle section of this corner, would give more satisfaction than the small rock ferns.

Another attractive feature of this fern bed was the wild flowers. Many sprang up from seeds in the soil, while others were brought from the woods. It was a source of early spring pleasure, while the croziers of the ferns were slowly unfolding, to watch for new blossoms each day, Jack-in-the-pulpit, hepaticas, violets, coltsfoot, Solomon's seal and others in their season. Even cowslips and cardinal flowers were persuaded to blossom in the swamp box. A sprig of meadow rue, a goldenrod, and a Joe-pye-weed also found a footing in this goodly company. Each day some new and charming aspect presented itself to the watcher, and with no extra labor. All these friends ask is to be left alone under favorable conditions and they will fulfill their destiny to the best of their ability.

Henry Ward Beecher once said:

"Ferns and flowers are the only things God made and forgot to put a soul into them."

SYRACUSE, N. Y.

Notes and news

Mr. William R. Maxon, of the United States National Museum, leaves on a collecting trip to Panama at the end of January.

On the evening of January 12, 1911, Mr. Robert A. Ware gave a talk on New England ferns before the Boston members of the Appalachian Mountain Club. He discussed the structure and growth of the fern and showed specimens of all the species native to New England. Other members of the American Fern Society who were present are Messrs. F. G. Floyd, H. G. Rugg, and E. J. Winslow.

Recent elections of interest:

President of the American Association for the Advancement of Science, Dr. Charles E. Bessey, professor of botany and dean at the University of Nebraska.

President of the Botanical Society of America, Professor W. G. Farlow, of Harvard University.

President of the Torrey Botanical Club, Dr. Henry H. Rusby, professor of botany and dean at the New York College of Pharmacy.

Mrs. M. A. Noble, of Inverness, Fla., whose herbarium was destroyed by fire some time ago, has received many specimens from members of the American Fern Society, but still lacks a large number, particularly of western species. Those who can spare duplicates of such specimens will confer a highly appreciated favor by sending them to Mrs. Noble.

Mr. W. A. Poyser, Hammond, Ind., offers specimens of *Equisetum scirpoides* Michx. to members of the American Fern Society.

Mr. Willard N. Clute, of Joliet, Ill., for a number of years chairman of the Advisory Council of the American Fern Society, has resigned as a member of the Advisory Council, and the office of chairman devolves on Dr. C. E. Waters, of the Bureau of Standards, Washington, D. C.

Corrections and additions to the list of members:

10. Barbour, W. C., Succasunna, N. J.....1910
129. Sanborn, Miss Sarah F., 54 Centre St., Concord, N. H...1910
130. Prince, Prof. S. Fred., 1207 W. Main St., Urbana, Ill.....1902

Stêere, Mrs. Wm. W., 10 Holmfield Ave., Hyde Park, Mass.

Grout, Dr. A. J., New Dorp, N. Y.....1911

Wharton, Miss Susan P., 910 Clinton St., Philadelphia, Pa.1911

Corrections or changes of address should be sent at once to the Secretary, Mr. L. S. Hopkins, Pittsburg, Pa.

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CONTENTS

The Pteridophyta of the arctic regions . CARL CHRISTENSEN 65
A new Antrophyum from Luzon (Plate 4) . R. C. BENEDICT 71
Fern collecting in Cuba . . . . . ELIZABETH G. BRITTON 75
New stations for Dryopteris Goldiana × marginalis in Vermont . . . . . EZRA BRAINERD 78
Asplenium acrostichoides Sw. . . . . E. J. WINSLOW 79
Some Southern California ferns . . . . . GEORGE L. MOXLEY 82
Notes on the gray polypody . . . . . STAFFORD C. EDWARDS 83
Review: THE FERNS OF MT. APO . . . . . R. C. BENEDICT 83
Additions to the herbarium . . . . . L. S. HOPKINS 85
Notes and news 89

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American Fern Journal

Vol. 1 APRIL 1911 No. 4

The Pteridophyta of the arctic regions

CARL CHRISTENSEN

The number of species of Pteridophyta growing in arctic regions is larger than one should imagine judging from the unfavorable climatic conditions of these regions. Still it must be remembered that the arctic regions north of the forest region of the Old and New World measure millions of square kilometers of very different nature, and one need not wonder that within such a vast area certain places are found where ferns can grow. Such places are, however, few and confined to certain smaller areas. The immense tundras of North America and North Asia are practically without true ferns, while some species of *Equisetum* and *Lycopodium* there find rather favorable habitats, the former in the numerous marshes and boggy places, the latter in the drier heaths of the slopes of the more undulated land among ericaceous shrubs (*Callinea*, etc.). Quite different as to climatic and partly as to edaphic conditions are the coast lands adjoining the straits between the Arctic Ocean and the Atlantic and Pacific oceans, Bering Strait, Baffin Bay with Davis Strait, and the broad gap between Greenland and Norway. There the warmer water coming from the south has a favorable effect on the temperature and the humidity

[No. 3 of the JOURNAL (1: 33-64. *pl. 2, 3*) was issued 13 F 1911.]

of the air, especially during the summer, and here we find ferns.

The northeastern corner of Asia (Chukches Land) is inhabited by three or four species of ferns, and from the opposite coast of Alaska Miss Alice Eastwood has enumerated not a few species collected near Nome City, among which are *Cystopteris montana* and *Gymnopteris triangularis*, which two species are unknown elsewhere in arctic regions. The former is a rather common species north of the polar circle in the Scandinavian peninsula, but it does not occur north of the forests. The occurrence of the second in arctic America is very surprising. It is a species of tropical relationship, which extends northward along the warm Pacific coast to British Columbia, and it is very strange that it should reach as far north as to Nome City. I do not remember whether the record is confirmed or not.

The regions around Baffin Bay (Baffin Land, Ellesmere Land, Grinnell Land on the west, and West Greenland on the east) are the headquarters of arctic ferns, and especially West Greenland possesses about the whole number of species. The outer conditions are here very favorable; a warm current, a branch of the Gulf Stream, runs along the west coast of Greenland, while on the other hand, the passages between Baffin Bay and the Arctic Basin are very narrow, and only small quantities of sea ice find the way through them to the bay. The summer is rather warm and the water open during the summer months as far north as to 83° N. lat. Because of these circumstances, the immense mass of land ice, which covers almost the whole archipelago, does not reach to the very shore, but leaves a rather broad coast land free from ice. This coast land is a rocky, often high country with deep fjords, which are often surrounded by land of comparatively low latitude, where sheltered, rather warm places are to be found. In these

places the vegetation may be remarkably rich, both in species and individuals, and even trees (birches) attain here a really considerable size. Ferns are here represented by several species which do not occur elsewhere in the arctic regions; for instance, *Dryopteris filix mas*, *D. Linnæana*, *D. phegopteris*, *D. dilatata*, *Polystichum lonchitis*, *Athyrium alpestre*, *Asplenium viride*, and species of *Botrychia*. In this region the fern vegetation reaches its farthest north, in Grinnell Land, 81° 50′ N. lat., where *Cystopteris fragilis*, *Equisetum arvense*, *E. variegatum*, and *Lycopodium selago* were found. In the Hayes Sound region, at about 79° N. lat., the ferns are rather numerous, and the botanist of the Sverdrup expedition, 1898-1902, Dr. Simmons, named a valley in the outer part of Hayes Land (Buchanan Strait) *Lastræa Valley*, where he found *Dryopteris* (*Lastræa*) *fragrans* in plenty.

The coast of East Greenland is colder than the west coast, because the huge masses of sea ice find their way out from the Arctic Basin to the Atlantic Ocean between Iceland and Greenland. The coast opposite Iceland is ice-covered to the very shore and here vegetation is practically wanting, but south and north of here an ice-free foreland is to be found, which, especially northwards, (from about 70° to 76° N. lat.) is of considerable breadth. Five species (*Cystopteris fragilis*, *Woodsia glabella*, *Equisetum arvense*, *E. variegatum*, and *Lycopodium selago*) extend here to about 78° N. lat.

The islands west of Greenland, Yan Mayen, Spitzbergen, Franz Josef Land (Iceland is generally not included in the arctic regions) are very poor in ferns. In Yan Mayen are found *Cystopteris* and *Equisetum arvense*, in Spitzbergen *Cystopteris fragilis*, *Woodsia glabella*, *Equisetum arvense*, *E. variegatum*, *E. scirpoides*, and *Lycopodium selago*. From Franz Josef Land no species of ferns have hitherto been recorded.

As might be expected, no arctic species is endemic;

all the species found are common in northern Europe and North America. Further, it is difficult to point out differences between the arctic forms of a species and those of the temperate regions. Some of them (especially the *Equiseta* and *Lycopodia*) are represented by low, appressed forms, which, however, may be found also in mountains of the temperate zone. No species may be said to be especially accommodated to arctic climate; *Dryopteris fragrans* and species of *Woodsia* might seem to be so by their dense covering of scales, but it is better to say that they are accommodated to the alpine climate of the higher mountains of the temperate regions and, therefore, possess the power of enduring the extreme climate of the farthest north.

A study of the arctic ferns will throw light upon several difficult problems with regard to the relationship between the American and the European flora. I shall, however, not discuss these questions here but perhaps make them the subject of a later paper.

In the following list all species of Pteridophyta known as arctic are enumerated; the figure added to each species means the degree of latitude of the northernmost locality in which the species was found.

1. *Woodsia alpina* (Bolton) Gray. Hayes Sound, 78° 53′; East and West Greenland, about 74°; Baffin Land.

2. *W. ilvensis* (L.) R. Br. Baffin Land; W. Greenland, 72° 48′; E. Greenland, 70°; Chukches Land.

3. *W. glabella* R. Br. Baffin Land; W. Greenland, 74° 18′; Hayes Sound, about 79°; E. Greenland, about 77°.

4. *Cystopteris fragilis* (L.) Bernh. Perhaps the most common arctic fern, found throughout, where ferns grow, extending to 81° 43′ (Grinnell Land); in E. Greenland to 78° 30′.

5. *C. montana* (L.) Bernh. Alaska: Nome City.

6. *Polystichum lonchitis* (L.) Roth. W. Greenland, 69° 14′; E. Greenland, 65°.

7. *Dryopteris filix mas* (L.) Schott. S. Greenland, 60–62°.

8. *D. fragrans* (L.) Schott. All around the arctic coasts and islands, extending to 79° (Hayes Sound). *D. aquilonaris* Maxon, from Nome City, is a forma *erosa* of this species.

9. *D. spinulosa dilatata* (Hoffm.) Und. Kotzebue Sound; W. Greenland, 69° 14′.

10. *D. phegopteris* (L.) C. Chr. W. Greenland, 65°; Alaska.

11. *D. Linnæana* C. Chr. W. Greenland, 69° 15′.

12. *Athyrium alpestre* (Hoppe) Ryl. S. Greenland, 60° 61′.

13. *Asplenium viride* Huds. W. Greenland, 62°; E. Greenland, 65° 35′.

14. *Botrychium lunaria* (L.) Sw. W. and E. Greenland, 70°.

15. *B. boreale* Milde. S. Greenland, 61°.

16. *B. lanceolatum* Angstr. W. Greenland, 63°.

17. *B. simplex* Hitch. W. Greenland, 60° 5′; a single plant found.

18. *Equisetum hiemale* L. W. Greenland, 60° 53′.

19. *E. variegatum* Schleich. Scattered over the archipelago north of America, extending to 81° 50′ (Grinnell Land), eastwards to Spitzbergen; Chukches Land.

20. *E. scirpoides* Michx. Kotzebue Sound; W. Greenland, 70°; Spitzbergen; the arctic regions of the Old World, reaching its farthest north (74°) in Novaya Zemlya.

21. *E. silvaticum* L. Kotzebue Sound; W. Greenland, 70°.

22. *E. arvense* L. Widely distributed, extending to 81° 43′ (Grinnell Land). The species is a variable one

and several dwarf forms have been described as varieties (var. *arctica* Rupr., var. *boreale* Milde, etc.).

23. *E. palustre* L. "Shores of the Arctic Sea" (Hooker).

24. *Lycopodium selago* L. Along the arctic coasts all around and found in most islands, extending to 81° 43′ at Grinnell Land and to 77° in E. Greenland.

25. *L. annotinum* L. Kotzebue Sound; Baffin Land; W. and E. Greenland to about 72°. The typical form is rare, the species being represented by a shorter, more rigid form, var. *pungens* Desv.

26. *L. clavatum* L. S. Greenland, 61°.

27. *L. complanatum chamæcyparissus* (A. Br.). W. Greenland, 69° 14′.

28. *L. alpinum* L. Baffin Land; W. and E. Greenland, 70°; Chukches Land.

29. *Selaginella selaginoides* (L.) Lk. W. Greenland, 64° 8′.

30. *S. rupestris* (L.) Spring. Mouth of Kolyma River, Northeast Siberia.

31. *Isoetes lacustris* L. W. Greenland, 60°.

32. *I. echinospora* Dur. W. Greenland, 68° 21′.

COPENHAGEN, FEBRUARY 1911.

A new Antrophyum from Luzon

R. C. BENEDICT

(PLATE 4)

The ferns of the Philippine Islands have especial interest for American fern students, both because of the present government of the islands and because the principal authority on Philippine ferns is an American botanist, Dr. E. B. Copeland, to whose work further reference is made in another page of this number of the JOURNAL.

In connection with a study of the fern tribe Vittarieæ, of which only a single species, *V. lineata* (L.) J. E. Smith, occurs in the United States, the writer has had occasion to examine the Philippine species of this tribe, and this study has brought to light the new species of *Antrophyum* here described. *Antrophyum* Kaulfuss is one of the three Vittarioid genera found in the Philippines, and in the Old World generally. It comprises twenty to twenty-five species (as I have found in the course of nearly five years' intermittent study). Of the other two Old World genera, *Monogramma* Schkuhr, with five species, is particularly interesting because it includes the two simplest species of ferns known, with leaves only an inch or two in length and with a single vein through the middle. *Vittaria*, the other genus, numbers nearly forty species, of which about sixteen are American. The Vittarieæ in America are otherwise represented by four more genera, *Anetium* Splitg., *Ananthacorus* Und. and Max., *Hecistopteris* J. Smith, each with a single species, and a group of ten species which have heretofore been called *Antrophyum*, but which appear to form a distinct genus.

The material of the species here to be described was collected by Mr. R. S. Williams in 1904, and is, like all his collections, splendidly prepared and almost as good as if fresh. I have seen no other material of this species, although I have had for examination the Vittarieæ from

the herbaria of the Bureau of Science at Manila, Yale University, the National Museum, the Underwood Fern Herbarium at the New York Botanical Garden, and part of Dr. Copeland's herbarium.

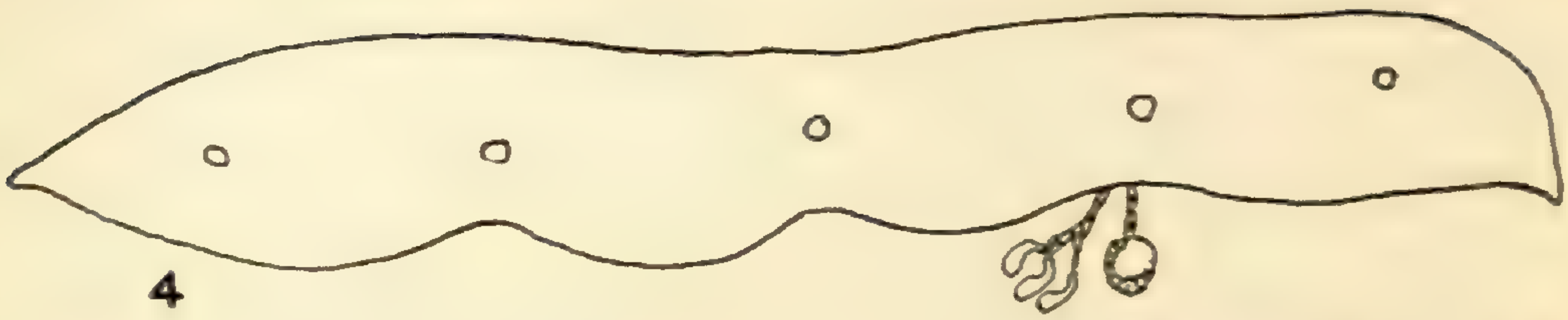
Antrophyum Williamsi sp. nov.

Plants small, epiphytic; stem creeping, dorsiventral, the phyllotaxy distichous; leaves 3–6, cespitose, rigid, 6-12 cm. long, nearly erect, often falcate; the petioles stout, 1.5-2 mm. thick, margined, usually nearly or more than half the length of the leaf; the blade linear-elliptic, 4-8 mm. broad, thick, usually somewhat revolute, the margins sharp, the upper surface smooth when fresh, wrinkled when dry but not showing the course of the veins, the leaf trace of two bundles, the veins forming 3-6 areolæ across the broadest part of the blade; sporangia in disjunct or occasionally branching lines, spreading at maturity so as almost completely to cover the back of the blade, in shallow open grooves; paraphyses clavate, usually bent at a right angle near the base, smooth, brown; spores triplanate.

Type collection from tree trunks, Baguio, Province of Benguet, Northern Luzon, Philippine Islands. *R. S. Williams 1579*, Nov. 3, 1904. Deposited in the Underwood Fern Herbarium, New York Botanical Garden.

Antrophyum is an interesting genus, totally unlike anything found here in the United States. The genus is characterized, first, by having the sporangia in lines of indefinite extent, usually in grooves, and always associated with sterile stalked paraphyses; second, by a system of simple netted veins all of which are practically equal in size, so that there is no midrib. All the species have simple entire leaves.

A. Williamsi is almost the smallest of the genus, in which are species with leaves two or three feet long and nearly a foot wide. *A. nanum* Fée, also found in the Philippines, is probably the smallest species and is like *A. Williamsi* in some respects, but differs in having



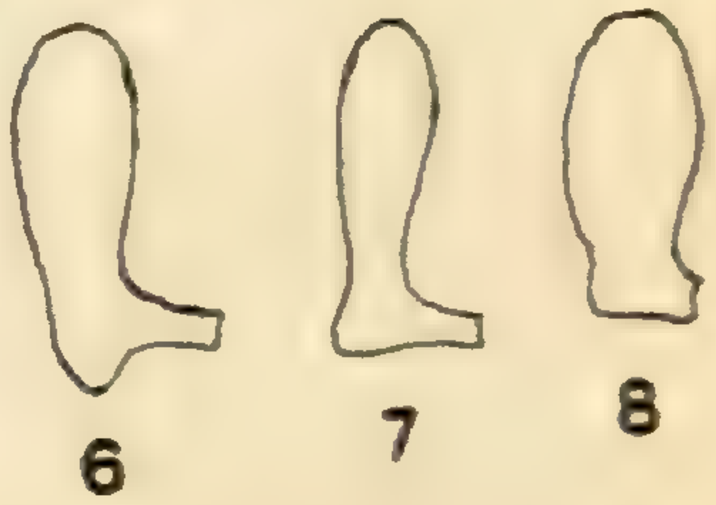


PLATE 4. ANTROPHYUM WILLIAMSI Benedict

spatulate leaves, with thinner, usually broader blades, on the upper sides of which the veins show; the petioles are much more slender, and the paraphyses are of a different shape.

A. Williamsi resembles *A. parvulum* Blume even more than *A. nanum*, but this species also has thinner leaves, of somewhat different shape; the veins are not evident on the leaf surface, and the petioles are proportionately much shorter; the paraphyses also are different. *A. parvulum* as a rule reaches a larger size than *A. Williamsi*.

Luzon and the other large Philippine Islands are, like Cuba, very incompletely known botanically. The northern, western, and southern portions have been the most explored and are fairly well known, but much of the interior and eastern part has always been difficult of access, both because of its very rugged mountainous topography, and because of the hostile character of the natives. Eventually it should yield a large number of interesting new plants.

EXPLANATION OF PLATE 4

1. Largest plant seen; natural size.
2. One of the smallest plants seen, natural size.
3. A single leaf from the plant shown in fig. 2, × 2.
4. Cross section of a medium-sized leaf blade, showing diagrammatically the attachment of the sporangia and the paraphyses, × 12.
5. Cross section of the petiole of the same leaf with its double leaf trace.
6–8. Typical forms of paraphyses, greatly magnified.

NEW YORK BOTANICAL GARDEN.

Fern collecting in Cuba

ELIZABETH G. BRITTON

A year ago in March we were camping in the Trinidad Mountains of the Province of Santa Clara, Cuba, collecting for the New York Botanical Garden. We secured a pack train of mules and horses, assistants and provisions at or near Cienfuegos, turned our backs on hotels and "all the comforts of home," and for two weeks lived in the wilderness, among the natives, though not with them. We met nothing but kindness and courtesy; for they shared their provisions with us even to the pedigreed fighting-cock eggs, which are worth their weight in silver if not in gold. They acted as guides and refused pay for their services, treated us as honored guests; we were not disturbed in our camps and lost absolutely nothing except time, which is not a commercial commodity.

The water supply of Cienfuegos comes from the Hanabanilla River, and we made our way first to the Falls, about twenty miles east from the city. This is a most picturesque spot, for on the dripping ledges under the falls were pendent masses of the pale green fronds of *Adiantum capillus-veneris* glistening with the spray and swaying about like emerald plumes. Mixed with it were the slender, graceful fronds of *Anemia Underwoodiana* Maxon. This spot is rich in species of maidenhair ferns, for besides the common and exasperating *Adiantum fragile* we found *A. tenerum*, *A. villosum*, *A. pulverulentum*, *A. melanoleucum*, and *A. cristatum*. On the banks in rich woods, *A. trapeziforme* grew most abundantly with glossy black stipes. *A. macrophyllum* and *A. petiolatum* also were here, and on the rocky ledges the rarer *A. cubense* was found.

The slopes of the Trinidad Mountains are full of deep valleys, known as arroyos, with streams flowing down

them into the larger rivers. To get into these and spend a day hunting for ferns and mosses is a joy and delight. Usually it necessitates a long horseback ride and some wading and scrambling after dismounting, with the occasional recompense of a bath in some cool, fascinating pool. The spleenworts are more or less common in these damp ravines; *Asplenium dentatum* occurs on the rocky ledges as it does at Miami, Florida, and the more delicate and slender *A. monteverdense* Hook. resembles *A. myriophyllum* as it grows in Florida. *A. cuneatum* is also fairly abundant in wet ravines and *A. formosum* occurs in the rocky beds of streams. A few small and attractive species of *Pteris* grew also on the cliffs with the spleenworts, *Pteris mutilata* on mossy rocks, on shady cliffs, or at the mouth of caves. *Doryopteris palmata* is also abundant near the falls. The very common silver fern, *Ceropteris* (*Gymnogramme*) *calomelanos* is here also, tall and luxuriant. But the greatest find of the day is always the tree ferns, for on their trunks not only do various species of filmy ferns grow, but also rare mosses and hepatics or interesting fern prothallia.

Perhaps the most surprising experience is to find an *Anemia*, *A. Underwoodiana*, growing in crevices of rocks in the bed of the stream when the most common species of Cuba, Florida, and the Bahamas, *A. adiantifolia*, is found usually on dry rocks and cliffs. Many of the broad, entire-leaved ferns are also the favorite homes of small hepatics with a peculiar odor, also of mosses and tiny round-spotted lichens. *Asplenium serratum* L., the "bird's nest fern," grows to be three feet high and six inches wide and is most showy with the long parallel rows of dark brown sori on the back. In contrast to this species, but very different in its large brown dots, is *Pessopteris* (*Polypodium*) *crassifolia*, which is found on dead and decaying trees in woods. *Campyloneurum phyllitidis*, our old and familiar friend of Florida and the

Bahamas, occurs here too on trees, and *C. costatum* is not uncommon. *C. angustifolium* hangs down from the trees in dense clusters like a *Vittaria*, which genus it resembles when curled up and dried. Among the bushes on the banks or drooping over the water, the taller species of *Dryopteris*, such as *D. oligophylla* Maxon and *D. patens* are sure to be found, and *D. parasitica* (*Aspidium molle*) also is rather common. Various species of *Tectaria* may be looked for here also; *T. heracleifolia* attains a large size at the Falls of the Hanabanilla, and all forms and sizes may be found in the various arroyos, from the young plants with small simple leaves, two to three inches long, to leaves two to three feet high, and variously lobed or with ragged incisions. *T. martinicensis* occurs along the banks of rivers and in beds of rocky streams near Guanabana and Siguanea. *T. coriandrifolia* (Sw.) Und. is rarer, and occurs in crevices and sides of wet rocks in dense woods.

Two species of *Blechnum* are more or less common. *B. serrulatum* growing among grasses, with *Pteridium caudatum* on the sunny summit of a hill 900 meters high, was rather surprising, especially as we usually find it in damp, shady places under palms on the borders of lagoons and streams. *B. occidentale* is perhaps quite as common in ravines and along streams in various parts of the island. *Olfersia cervina* Kze. with its very unlike fertile and sterile fronds, has leaves occasionally 1.5 meters long and grows in ravines and on wooded hillsides. The climbing species of polypody of the genus *Phymatodes*, especially *P. lycopodioides*, occurs on trees and bushes, as they do so commonly in Jamaica, and *Polypodium polypodioides* grows on limestone cliffs as well as on trees as it does in other parts of Cuba and the United States.

NEW YORK BOTANICAL GARDEN.

New stations for Dryopteris Goldiana × marginalis in Vermont

EZRA BRAINERD

When Dr. Philip Dowell published his account of a hybrid between *Dryopteris Goldiana* and *D. marginalis*, in 1908,* the plant was known from one station only, near Newton, N. J., collected July 4, 1907. When I read his paper I called to mind a locality in the Green Mountains where both these species grew in great profusion, a narrow wooded ravine with steep rocky slopes rising about 400 feet for a distance of one or two miles on either side. Among the broken rocks at the base of the valley ran a small cold brook, with occasional small patches of alluvium and leafmold. It occurred to me that if these two species of *Dryopteris* hybridized, the hybrid should be found there; and the finding of it, of set purpose, more than two hundred miles from the only known station, would not only be a pleasure in itself, but a strong confirmation of its hybrid origin.

Accordingly, on July 16, 1909, I visited the station. The weather was fair in the morning; but during a drive of nine miles, a row of one mile, and a walk of three miles to an altitude of 1,250 feet, the clouds had gathered; and when I reached the station a gentle rain set in that promised to last through the afternoon. In spite of these unfavorable conditions, in less than an hour's search I found a plant of the hybrid, which afforded two good fronds for dried specimens and a fine rootstock for the garden.

But it turned out that I was not the first to collect the plant in Vermont. Mr. Harold G. Rugg, of Dartmouth College, in September, 1909, collected a plant of this hybrid along the "Gulf Road," Cavendish, Vt.; Miss Slosson veri-

*Bull. Torrey Club **35**: 139. 20 Ap 1908.

fied his determination from fronds sent her soon after. One or two years before, from the same station, Mr. Rugg had transplanted to his fernery a plant, supposed to be *D. Goldiana*, which turned out to be its hybrid with *D. marginalis*. The station in Cavendish Gulf was independently discovered the same summer (1909) by Mrs. Elizabeth B. Davenport, of Brattleboro. She was passing through on an automobile trip, without lens or collecting apparatus, and took no specimen; but her friend, Mrs. James Hartness, transferred to her garden in Springfield, Vt., a plant which Mr. Rugg examined in September, after receiving Miss Slosson's report, and recognized as the hybrid which he too had collected at the same station.

A third station in Vermont for this hybrid was found in Pittsford, August, 1910, by Miss Slosson herself.

For completeness of record, I cite here the other known stations for the plant, in addition to the original locality where Dr. Dowell discovered it in 1907:

Near Jamesville, N. Y., R. C. Benedict, June, 1908; Torreya **8**: 284. 6 Ja 1909.

Waterloo, N. J., *Dowell 5923*, August 9, 1909; Am. Fern Journal **1**: 14. Au 1910.

West Englewood, N. J., R. C. Benedict and Philip Dowell (*6231*), June 18, 1910.

MIDDLEBURY, VERMONT.

Asplenium acrostichoides Sw.

E. J. WINSLOW

During the past summer I was led to observe with special care the forms of *Asplenium acrostichoides* Sw. as it occurs in northern Vermont. A form growing in moist, rich woods particularly impressed me as a marked variation from the ordinary conception of the species.

There is no lack of intergrading forms and this is probably an ecological variation, but it is so at variance with the published descriptions that I was on the point of giving it a form name for purposes of reference when I chanced upon D. C. Eaton's reference to "a variety *serratum*" described by Lawson in the Canadian Naturalist.*

Lawson's description reads:† "*β serratum.*—Lobes of the pinnæ ovate-oblong, approximate, strongly and incisely serrate. This may be regarded as a subvariety.—Belleville, J. Macoun."

The description of my form would read something as follows: Pinnæ triangular-lanceolate, pinnæ and lobes broader and less numerous than in the typical form of the species, lobes coarsely crenate-dentate, veinlets forked.

The forms are evidently alike in one important respect, and the apparent difference may be partly due to incomplete description. I have figured my p'ant in the hope that it may come to the notice of someone who has access to authentic specimens of variety *serratum.*

There appeared in an early number of the Fern Bulletin a discussion by Mr. B. D. Gilbert, in which he separated *Asplenium acrostichoides* Sw. from *A. acrostichoides* var. *thelypteroides* Michx. Of the former he says:‡ "Pinnæ and pinnules broad, sori on lower pinnæ often athyrioid." Of the latter, "Pinnæ and pinnules narrow, sori straight, parallel, set closely together."

So far as I have been able to learn, this article, published eleven years ago, did not lead to any further discussion of the matter. And in general this attractive and interesting fern has apparently not received the

*D. C. Eaton, Ferns of North America **2**: 35. 1880.

†George Lawson, Canad. Nat. 276. 1864; reprint from the Edinb. New Phil. Journ. 15. January and April 1864.

‡Fern Bulletin **8**: 9. 1900.

attention it deserves. The fern is evidently very sensitive to light and moisture. In open and comparatively dry situations the pinnæ are narrow, with lobes small,

Moist woods form of *A. acrostichoides*

simple-veined, and almost entire. This is probably var. (better forma) *thelypteroides;* while the form here figured and perhaps var. *serratum* are the opposite extreme.

I do not remember having seen any southern forms that could not be matched from our New England woods. And I do not remember any form that does not have some so-called "athyrioid sori." It would be interesting to hear regarding this from some one who has access to the specimens of Lawson or Gilbert.

LASELL SEMINARY, AUBURNDALE, MASS.

Some Southern California ferns

GEORGE L. MOXLEY

A mere novice I—one of the younger fern enthusiasts—and I have only been studying the dainty plants a short time. In this time I have found the following ferns: Probably the most common are *Gymnopteris triangularis* (Kaulf.) Underw. and *Pellæa andromedifolia* (Kaulf.) Fée. Perhaps next comes *Polypodium Scouleri* H. & G. Then, on the higher mountain slopes, are found *Dryopteris rigida arguta* (Kaulf.) Und., *Cheilanthes californica* (Nutt.) Mett., *Polystichum munitum* (Kaulf.) Und. I have also collected *Woodwardia radicans* (L.) Sm., *Adiantum capillus-veneris* L., *Pellæa ornithopus* Hook., and another *Pellæa*, which I think is distinct from *P. andromedifolia*, but I am not yet sure.

But the most pleasant surprise was when I stumbled upon a station for *Cystopteris fragilis* (L.) Bernh., a fern that I had never seen but which I almost knew by intuition.

I do not suppose that this by any means completes the catalogue of our local ferns, but I have not yet collected any others. Of the allies the only one yet identified is *Azolla filiculoides* Lam., which is quite plentiful in some places.

LOS ANGELES, CALIF.

Notes on the gray polypody

STAFFORD C. EDWARDS

During the past December, while roaming the woods and fields around Whiteville, N. C., one of the most noticeable objects of interest was a small polypody. The oft-met little fern proved to be the gray polypody, *Polypodium polypodioides* (L.) Hitch. The fall months had been very dry and the little fronds were considerably curled. Partly decaying logs seemed to be a favorable host, the running rootstocks clinging in the crevices of the bark and growing on the sawed ends of the logs as readily as a shelving fungus. The rails of an old fence were decorated with the same plants. On the village street a large deciduous tree supported on its bark a vigorous growth of the fern, from a point easily within reach to a distance up to the branching portion of the trunk. On the border of a large swamp this polypody was found starting at the base of a large oak, climbing the trunk on two sides and extending its rootstocks along many of the branches, carrying the little upright green fronds to the very tips of the topmost boughs, a sight to attract the attention of the most careless and to arouse the admiration of a naturalist.

NEW BRIGHTON, N. Y.

Review: THE FERNS OF MT. APO*

Fern students in the United States are wont to congratulate themselves when they find as many as fifteen or twenty species of ferns in a single woods. If there are found in a single county as many as forty species, the county is considered good collecting ground. The largest

*The Ferns of Mt. Apo. Leaflets Philip. Bot. **3**: 791-851. 15 N 1910.

number of ferns recorded for any single state is not far from eighty, and for the whole United States, the number is about two hundred.

Think then of finding upon a single mountain more than two hundred and fifty species, for that is the number Dr. E. B. Copeland records in his recent paper. Think of finding on a single mountain thirty-three kinds which had not been found anywhere else! Fifteen of these are described for the first time in the paper under consideration. As only a few botanists have collected on Mt. Apo, it is likely that more will be found.

Mt. Apo is the highest mountain in the Philippines. It is situated in southeastern Mindanao on the west side of the long Davao Bay, and rises to a height estimated to be ten thousand feet. Its base covers an area fifteen to twenty miles in diameter.

As Dr. Copeland notes, "Every botanical collector knows that he can make his richest collections on and about high mountains." He suggests that with its more than two hundred and fifty species, Mt. Apo is the richest in fern species of any known area of similar size. It would be interesting to make careful count of the number of species in a similarly restricted part of the Blue Mountains of Jamaica. Perhaps the unexplored Sierra Maestra of Cuba, which reaches up about eight thousand feet, may be found to surpass Mt. Apo in the richness of its fern flora.

Mr. R. S. Williams, of the New York Botanical Garden, who is one of the few botanists who have collected on Mt. Apo, tells me that several endemic birds have also been found there, one of them a robin.

Dr. Copeland, who is a government employee, has probably contributed during the last few years a greater amount of descriptive taxonomic fern literature than anyone else in the same period. He has had exceptional facilities in the way of field work, and has taken every

advantage of them. In one of his papers he has given a very interesting ecological study of the ferns of a portion of Mindanao. R. C. B.

ADDITIONS TO THE HERBARIUM

Since the last report, two hundred and sixty-seven mounted sheets have been added to the Society herbarium. The list includes the latest addition to our fern flora, *Dryopteris filix-mas* × *marginalis* Winslow, as well as what is perhaps the rarest North American fern, *Cheilanthes Parishii* Dav.

A sheet of *Asplenium ebenoides* R. R. Scott was received from the Sussex Co. (N. J.) Nature Club too late to be included in the list given below:

1. *Adiantum capillus-veneris* L.
2. *Adiantum Jordani* K. Müll.
   (*Adiantum emarginatum* Hk.)
3. *Adiantum pedatum* L.
4. *Asplenium germanicum* Weis.
5. *Asplenium montanum* Willd.
6. *Asplenium platyneuron* (L.) Oakes
7. *Asplenium resiliens* Kze.
   (*Asplenium parrulum* Mart. & Gal.)
8. *Asplenium ruta-muraria* L.
9. *Asplenium septentrionale* (L.) Hoffm.
10. *Asplenium trichomanes* L.
11. *Asplenium vespertinum* Maxon
12. *Athyrium acrostichoides* (Sw.) Diels
13. *Athyrium angustifolium* (Michx.) Milde
    (*Asplenium angustifolium* Michx.)
    (*Asplenium pycnocarpon* Spr.)
14. *Athyrium filix-femina* (L.) Roth
15. *Athyrium filix-femina* f. *polyclados* Moore
17. *Botrychium dissectum* Spr.
18. *Botrychium lanceolatum* (S. G. Gmel.) Ångstr.
19. *Botrychium neglectum* Wood

20. *Botrychium obliquum* Mühl.
21. *Botrychium virginianum* L.
22. *Camptosorus rhizophyllus* (L.) Link
23. *Ceropteris triangularis* (Klf.) Und.
    (*Gymnogramma triangulare* Klf.)
24. *Ceropteris viscosa* (Eat.) Und.
25. *Cheilanthes Clevelandii* Eat.
26. *Cheilanthes Feei* Moore
27. *Cheilanthes Fendleri* Hk.
28. *Cheilanthes gracillima* Eat.
29. *Cheilanthes lanosa* (Michx.) Watt
30. *Cheilanthes Parishii* Dav.
31. *Cystopteris bulbifera* (L.) Bernh.
32. *Cystopteris fragilis* (L.) Bernh.
33. *Cystopteris montana* (Lam.) Bernh.
34. *Dennstaedtia punctilobula* (Michx.) Moore
    (*Dicksonia pilosiuscula* Willd.)
35. *Dicksonia pilosiuscula cristata* Moore
36. *Dryopteris Clintoniana* (Eat.) Dowell
37. *Dryopteris concordiana* Dav.
38. *Dryopteris cristata* (L.) Gray
39. *Dryopteris dilatata* (Hoffm.) Gray
40. *Dryopteris filix-mas* (L.) Schott
41. *Dryopteris Goldiana* (Hk.) Gray
42. *Dryopteris intermedia* (Mühl.) Gray
43. *Dryopteris marginalis* (L.) Gray
44. *Dryopteris noveboracensis* (L.) Gray
45. *Dryopteris simulata* Dav.
46. *Dryopteris spinulosa* (Müll.) O. Ktze.
47. *Dryopteris thelypteris* (L.) Gray
48. *Dryopteris Clintoniana* × *Goldiana* Dowell
49. *Dryopteris Clintoniana* × *intermedia* Dowell
50. *Dryopteris cristata* × *Clintoniana*
51. *Dryopteris cristata* × *Goldiana* Benedict
52. *Dryopteris cristata* × *intermedia* Dowell

    [*Dryopteris Boottii* (Tuck.) Und.]

53. *Dryopteris cristata* × *marginalis* Dav.
54. *Dryopteris cristata* × *spinulosa* (Milde) C. Chr.
55. *Dryopteris filix-mas* × *marginalis* Winslow
56. *Dryopteris Goldiana* × *marginalis* Dowell
57. *Dryopteris intermedia* × *spinulosa* (?)
57. *Equisetum arvense* L.
58. *Equisetum Funstoni* f. *nudum*
59. *Equisetum Funstoni* f. *ramosissimum*
60. *Equisetum hiemale* L.
61. *Equisetum hiemale affine* A. A. Eat.
62. *Equisetum hiemale intermedium* A. A. Eat.
63. *Equisetum littorale* Kühl.
64. *Equisetum robustum* A. Br.
65. *Equisetum silvaticum* L.
66. *Equisetum telmateia* Ehrh.
67. *Hypolepis californica* (Nutt.) Hk.
(*Cheilanthes californica* Mett.)
68. *Lycopodium annotinum* L.
69. *Lycopodium lucidulum* Michx.
70. *Lycopodium sabinæfolium* Willd.
71. *Lycopodium selago* L.
72. *Lycopodium tristachyum* Pursh
73. *Lygodium japonicum* (Thbg.) Sw.
78. *Lygodium palmatum* (Bernh.) Sw.
79. *Matteuccia struthiopteris* (L.) Tod.
80. *Notholæna cretacea* Liebm.
81. *Notholæna Newberryi* Eat.
82. *Notholæna Parryi* Eat.
83. *Onoclea sensibilis* L.
84. *Ophioglossum vulgatum* L.
85. *Osmunda cinnamomea* L.
86. *Osmunda cinnamomea* f. *angusta* Clute
87. *Osmunda cinnamomea* f. *frondosa* Gray
88. *Osmunda Claytoniana* L.
89. *Osmunda regalis* L.
90. *Osmunda regalis* f. *orbiculata* Clute

91. *Pellæa atropurpurea* (L.) Link
92. *Pellæa glabella* Mett.
93. *Phegopteris dryopteris* (L.) Fée
94. *Phegopteris hexagonoptera* (Mich.) Fée
95. *Phegopteris phegopteris* (L.) Und.
96. *Polypodium californicum* Klf.
97. *Polypodium glycyrrhiza* Eat.
    (*Polypodium falcatum* Kell.)
98. *Polypodium vulgare* L.
99. *Polystichum acrostichoides* (Michx.) Schott
100. *Polystichum aculeatum* (L.) Schott
101. *Pteridium aquilinum* (L.) Kuhn
    (*Pteris aquilina* L.)
102. *Pteridium aquilinum* **longifolium** nom. nov.
    (*Pteris aquilina longifolia* Hook.)
103. *Selaginella apus* (L.) Spring
104. *Selaginella Bigelovii* Und.
105. *Selaginella Parishii* Und.
106. *Selaginella pusilla* Pursh
107. *Woodsia alpina* (Bolton) Gray
    (*Woodsia hyperborea* R. Br.)
108. *Woodsia obtusa* (Spr.) Torr.
109. *Woodwardia areolata* (L.) Moore
110. *Woodwardia spinulosa* Mart. et Gal.
111. *Woodwardia virginica* (L.) J. E. Sm.

The distribution of the species contributed is as follows:

Alabama, 3, 7, 21, 29, 43, 91.
Austria, 33.
California, 1, 2, 10, 11, 20, 23, 24, 25, 27, 28.
California, 1, 2, 10, 11. 20, 23, 24, 25, 27, 28, 30, 32, 57, 58, 59, 64, 66, 80, 81, 82, 96, 97, 100, 102, 104, 110.
District of Columbia, 20.
Georgia, 73.
Germany, 4, 9.
Maine, 38, 42, 43, 46, 68, 70, 87, 94, 101.

Missouri, 3, 13, 21, 22, 26, 31, 32, 60, 83, 88, 91, 92, 94, 99.

New Hampshire, 71.

New Jersey, 6, 8, 22, 31, 45, 52, 53, 56, 91, 106, 108.

New York, 3, 10, 12, 14, 17, 18, 19, 21, 31, 32, 34, 36, 38, 39, 41, 42, 43, 44, 45, 46, 47, 48, 53, 54, 57, 79, 83, 85, 88, 89, 93, 94, 95, 98, 99, 101, 103, 109, 111.

Ohio, 5, 6, 10, 13, 14, 21, 22, 31, 32, 34, 36, 38, 41, 42, 43, 44, 46, 47, 51, 52, 57, 61, 62, 65, 69, 79, 88, 89, 91, 93, 94, 95, 99, 101, 111.

Pennsylvania, 5, 21, 29, 32, 34, 38, 42, 46, 53, 57, 63, 84, 98, 99, 101, 308.

South Carolina, 3, 6, 14, 20, 47, 85, 89, 99, 109.

Vermont, 8, 14, 15, 17, 32, 34, 36, 37, 39, 40, 46, 49, 50, 55, 57, 70, 71, 72, 86, 90, 94, 107.

Virginia, 13.

The names of the donors and the number of specimens contributed by each are given below:

Darling, Miss Nancy, 2.
Davis, Rev. John, 32.
Dowell, Dr. Philip, 60.
Dutton, D. Lewis, 6.
Hopkins, L. S., 91.
Lee, Dr. E. L., 6.
Merrill, Henry W., 12.
Mirick, Miss Nellie, 7.
Moxley, Geo. L., 5.
Poyser, W. A., 1.
Rugg, Harold Goddard, 9.
Saunders, C. F., 7.
Winslow, E. J., 29.

L. S. HOPKINS, PITTSBURG, PA.

Notes and news

Prof. J. M. Macoun, botanist of the Geological Survey of Canada, has recently returned from an extraordinary expedition to the northern end of Hudson Bay. The steamer Jeanie, on which the party was cruising, was wrecked on the evening of September 7, 1910, at Wager Inlet, which is almost on the Arctic Circle. All the

specimens were saved and fortunately no lives were lost, but the party was forced to travel 1,200 miles, by sea and land, in order to get back to civilization. The last 800 miles of this distance were covered by an overland trip from Churchill to Gimli, Manitoba. The botanical specimens will prove of great interest, as we have no records of any botanist having previously visited the upper west coast of Hudson Bay.

Dr. Hermann Christ, of Basel, Switzerland, well known as a fern taxonomist, has recently sold his fern herbarium to Prince Roland Bonaparte. Dr. Christ's herbarium was probably the largest private fern herbarium ever accumulated and has been built up during a long period of years, during which he has been frequently called upon to identify new collections of ferns from all over the world. The herbarium of Prince Roland Bonaparte is now probably the largest public or private fern herbarium in the world, containing more than 100,000 specimens.

Dr. Christ has recently completed his study of ferns with the publication of his book, "Die Geographie der Farnen." He well deserves the title of "Dean Emeritus" of fern taxonomists.

A few members of the Fern Society are planning an informal field meet in central Connecticut for Friday, Saturday, and Sunday, June 16th, 17th, and 18th. Headquarters will be in Hartford, whence excursions will be made by steam and trolley. Mr. C. H. Bissell and Mr. H. C. Bigelow will act as guides. Although one purpose of the meet is to promote a better acquaintance among members of the Fern Society, other botanists will be cordially welcome. It will be an assistance in making arrangements for the meet if those who plan to attend will send word to Mr. C. H. Bissell, Southington, Conn.

Geo. L. Fisher would be pleased to exchange. free, ferns and flowering plants of New Mexico and foreign countries with any person desiring them. A list will be sent for the asking. Address Lockney, New Mexico.

Mr. L. S. Hopkins offers a set of 100 sheets (including 100 species and varieties) of North American pteridophytes, chiefly from Ohio, Pennsylvania, and California, for $10. He offers to pay ten cents a sheet for any species of pteridophytes not now in his herbarium. Address Lincoln H. S., Pittsburg, Pa.

Mr. Robert A. Ware, 246 Devonshire St., Boston, Mass., would like to exchange specimens of ferns and allied plants with anyone similarly interested. He desires particularly some species from the southern and western states, but will be glad to get specimens from elsewhere. He invites correspondence in regard to exchange. Moreover, he offers to send to any member who will apply to him and send postage, specimens of any of several species of which he has ample material.

Additions to the list of members and subscribers:

Barnhart, Dr. J. H., N. Y. Bot. Garden, Bronx Park, N. Y.
Bayne, Hon. Howard R., 75 St. Mark's Pl., New Brighton, N. Y.
Bessey, Prof. Chas. E., University of Nebraska, Lincoln, Neb.
Bicknell, Eugene P., 30 Pine St., N. Y. City.
Bonaparte, Prince Roland, 10 Avenue d' Jena, Paris, France.
Brainerd, Dr. Ezra, Middlebury, Vt.
Britton, Mrs. Elizabeth G., N. Y. Bot. Garden, Bronx Park, N. Y.
Britton, Dr. N. L., 2965 Decatur Ave., Bronx, N. Y. City.
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Colstrom, Carl A., 225 Wisconsin St., Chicago, Ill.
Dartmouth College Library, Hanover, N. H.
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Decker, C. A., 73 N. Y. Ave., West New Brighton, N. Y.
Dodge, Raynal, Newburyport, Mass.
Dunham, Mrs. Elizabeth M., 324 Central St., Auburndale, Mass.
Durand, Dr. Elias J., Univ. of Missouri, Columbia, Mo.
Edwards, Stafford C., Sharon Ave., New Brighton, N. Y.
Eggleston, W. W., Bureau of Plant Industry, Washington, D. C.
Fitzpatrick, Prof. T. J., Lamoni, Decatur Co., Iowa.
Forbes, F. F., Brookline, Mass.

Gray Herbarium, Harvard University, Cambridge, Mass.
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Hurd, Mrs. Arthur T., North Hartland, Windsor Co., Vt.
Jennings, Prof. Otto E., Carnegie Museum, Pittsburg, Pa.
Kastner, C. F. R., 41 Oak St., Westfield, N. Y.
Kendall, Miss Alice C., Holden, Mass.
Limric, Rev. H. G., Apartado 430, Mexico City, Mexico.
Lindahl, Dr. Josua, 5700 Peoria St., Chicago, Ill.
Lloyd Library, 309 W. Court St., Cincinnati, Ohio.
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Mattern, Walter, 105 S. Fourth St., Allentown, Pa.
Mawhinney, Geo. S., 290 Heberton Ave., Port Richmond, N. Y.
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Rossberg, Wm. B., 165 Main St., New Britain, Conn.
Royal Swedish Academy of Sciences, Library, Stockholm, Sweden.
Schaefer, Prof. C. L., 201 Broadway, Port Richmond, N. Y.
Schmidt, F., Fort Pl., New Brighton, N. Y.
Slosson, Miss Margaret, 1142 Madison Ave., N. Y. City.
Spalding, Mrs. W., 403 Marshall St., Syracuse, N. Y.
Taylor, Norman, Central Museum, Eastern Parkway, Brooklyn, N. Y.
University of Nevada Library, Reno, Nev.
Willcox, William G., 115 Davis Ave., West New Brighton, N. Y.

Corrections in the list of membership:

22. Brown, Miss Elizabeth G., 4 West St., Utica, N. Y. 1904.
24. Burnham, Stewart H., R. F. D. 2, Hudson Falls, N. Y.
55. Fisher, Prof. Geo. L., Lockney, N. Mex. 1906.
57. Flett, J. B., 812 North L St., Tacoma, Wash.
91. Lombard, Mrs. Charles B., Plymouth, Mass. 1910.
135. Ridlon, Harry C., 68 Clinton St., Springfield, Vt. 1908.

Resignations since December 1, 1910:

Nos. 23, 43, 61, 75, 82, 140 in the last annual report.

NOTE.—Kindly notify the editor of any errors or omissions.

Vol. 1 JULY 1911 No. 5

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CONTENTS

The tropical American species of Dryopteris subgenus Eudryopteris . . . . . CARL CHRISTENSEN 93

Botrychium Jenmani in Cuba . . . . . R. C. BENEDICT 98

A new variety of the cinnamon fern . . . . LEWIS S. HOPKINS 100

A list of the ferns found in the vicinity of Ohio Pyle, Pa. LEWIS S. HOPKINS 101

Southern California fern notes . . . . . GEORGE L. MOXLEY 104

The study of fossil ferns . . . . . F. H. KNOWLTON 105

Ferns of the Isthmus of Panama . . . . GEORGE F. CLEVELAND 111

Cyrus Guernsey Pringle . . . . . HAROLD GODDARD RUGG 114

The field meeting at Hartford . . . . . E. J. WINSLOW 115

Notes and news 118

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American Fern Journal

Vol. 1 JULY 1911 No. 5

The tropical American species of Dryopteris subgenus Eudryopteris

CARL CHRISTENSEN

While most of the species of *Dryopteris* occurring in the north temperate regions belong to the subgenus *Eudryopteris*, this subgenus is rather poorly represented in the tropics. The subgenus is in this paper delimited to include only the species belonging to the group of *D. filix mas*, and confined thus it is a most natural group, no doubt worthy of generic rank (*Dryopteris* proper), and not much related to the other groups of the genus. *Eudryopteris* as understood here is not to be confounded with the subgenus *Eudryopteris* of my Index Filicum. In a larger paper soon to be issued I shall give the characters of the different subgenera of *Dryopteris*, while here I intend to mention briefly some of the species of *Eudryopteris* from tropical America.

Till now I know only 10 species from the whole of tropical America, which all but one grow in Mexico. The rich fern localities, Jamaica and southern Brazil, have only two species each, the same two, *D. paleacea* and *D. patula*, and the South American Andes have, besides these, only one more, *D. Saffordii*, described below. The two species mentioned are widely distributed, from Mexico to Peru and from Jamaica to northern Argentina. In Mexico a considerable number of forms occur, which may all be referred to 9 species, although

[No. 4 of the JOURNAL (1: 65-92. *pl.* 4) was issued 3 My 1911.]

several more have been described. Especially the tri-quadripinnatifid *D. patula* varies exceedingly here, and it is very difficult by studying dried material alone to arrive at a definite conclusion in regard to the specific value of the often very different forms. The following can, I believe, be considered good species:

1. **Dryopteris Saffordii** sp. nov.

Rhizome unknown. Stipes short, 7–8 cm. long, stramineous, sparsely clothed with ovate, thin, pale yellowish scales. Lamina lanceolate, 30 cm. long, 10 cm. broad at the middle, the base attenuate, papyraceous or coriaceous, pale green below, bipinnatifid. Rachis stramineous, sulcate above, minutely glandular and sparsely paleaceous. Pinnae opposite, attenuated towards the acute point from a broader, sessile base, the middle ones 5 cm. long, 1–1.5 cm. broad, the lower gradually reduced, remote, the lowermost about 2 cm. long, all minutely glandular throughout and incised to a wing 1 mm. broad. Lobes oblique, triangular, acute, faintly serrate, the upper basal one longer and broader, subpinnatifid. Veins immersed, indistinct, often furcate, 3–4-jugate. Sori medial, rather large, clothed with reniform, reddish, minutely glandular, persistent indusia.

Type from Peru, mountains back of Lima, Arroyo Railway, collected by William E. Safford, March 1892, *no. 994* (U. S. National Herbarium).

A near relative of *D. filix mas*, differing by the less cut lamina, which is nearly coriaceous in texture and densely viscid throughout with minute, glossy glands.

2. D. FILIX MAS (L.) Schott, Gen. Fil. *pl. 9.* 1834.

Extends southward only to southern Mexico, wherefrom I have seen some few specimens.

3. **Dryopteris paleacea** (Sw.) comb. nov.

Aspidium paleaceum Sw. Syn. Fil. 52. 1806.

Aspidium parallelogrammum Kze. Linnæa **13:** 146. 1839.

This is commonly referred as a variety to *D. filix mas*, but I see no reason for not separating it as a valid species. It is widely distributed in tropical America, and is a very uniform species. The type came from Peru. I have specimens from San Domingo (*Eggers 2306*); Jamaica; Blue Mountain Peak, Mexico, common; Guatemala; Costa Rica; Columbia; Peru; Bolivia; Argentina; South Brazil.

4. D. FOURNIERI (Bak.) C. Chr. Ind. 266. 1905.

Mexico. I am inclined to believe that this small species is the same as *Nephrodium mexicanum* Presl. and it is perhaps not specifically distinct from the following.

5. D. GLANDULIFERA (Liebm.) C. Chr. Ind. 267. 1905.

Mexico. A rather doubtful species.

6. **Dryopteris cinnamomea** (Cav.) comb. nov.

Tectaria cinnamomea Cav. Descr. Pl. 252. 1802.

Aspidium athyrioides Mart. et Gal. Mém. Ac. Brux. **15:** 67. *pl. 18.* 1842.

Dryopteris athyrioides O. Ktze. [See C. Chr. Ind. 253, where the full synonymy is given.]

Aspidium agatolepis Fée, 8 Mém. 106. 1857.

A fragment in Herb. Swartz, Stockholm, of the type specimen from Mexico, Chalma, leg. Luis Née, shows that *D. athyrioides* (Mart. et Gal.) O. Ktze. must bear the older name of Cavanilles. It is a variable species, known from Mexico only.

7. D. INDECORA (Liebm.) C. Chr. Ind. 272. 1905.

Mexico. A very doubtful species, founded on three imperfect leaves.

8. D. PATULA (Sw.) Und. [See C. Chr. Ind. 283. 1905, for synonymy.]

Type from Brazil, where the species varies only a little. A slightly different form was collected in Jamaica by

Hart, and I dare not separate out as species the numerous Andine forms, which are found from Arizona to Ecuador. I can distinguish two or three varieties, which I prefer to describe in another paper. *Nephrodium mexicanum* Presl is commonly supposed to belong here; as mentioned above, I believe it is identical with *D. Fournieri*.

9. **Dryopteris Maxoni** Und. & C. Chr. sp. nov.

Rhizome oblique, thick, sparsely paleaceous. Stipes thick, stramineous, terete, 3–4 dm. long, sparsely clothed with entire, ovate, pale or black-brown scales. Lamina deltoid, deltoid-ovate or ovate-lanceolate, 4-6 dm. long, papyraceous or almost coriaceous, pale green, quite destitute of hairs, but furnished with scattered pale small scales on the rachis and on the costae below, bipinnate-tripinnatifid. Pinnae subopposite, the basal pair subovate, scarcely shortened, the middle ones tapering from the base to the acute apex, all short-petiolate, equilateral, the largest up to 15 cm. long. Pinnulae remote, equilateral, the lower ones free with the base contracted, the middle decurrent, the upper confluent, pinnatifidly cut almost to the costula. Lobes oblong, entire or often dentate at the truncate apex. Veins furcate. Sori 1 or 2 to a lobe, covered with large, reniform, hemispherical, coriaceous indusia, which are minutely glandular and perfectly conceal the sporangia.

Specimens of this species were distributed some years ago under the name *D. Maxoni* Und. n. sp., by C. G. Pringle, *no. 8846*, but the species has been undescribed until now. Specimens of this were included in several lots forwarded to me at different times by Mr. Wm. R. Maxon, and it is a pleasure to me to publish the description in this JOURNAL and to follow Underwood in dedicating it to my American friend in Washington, to whom I am indebted for numerous courtesies.

D. Maxoni seems to be a common species in southwest Mexico, in the states of Morelos, Michoacan, and Jalisco. Recently I have received numerous specimens from Prince

Roland Bonaparte, collected near Morelia, Michoacan, by F. Arsène. The type specimen is from Morelos, canyons above Cuernavaca, 5,500 ft., *Pringle 6190* (U. S. National Herbarium), which specimen belongs to a more fully developed form than *Pringle 8846*, to which the name was originally applied. I have seen several other specimens in various herbaria.

D. Maxoni is a very distinct species, perhaps most closely related to the Californian *D. rigida arguta* Und. It is especially well marked by its large indusia, but the thick, straw-colored, somewhat fleshy stipe and rachis are also very characteristic. From *D. patula* it can be distinguished at once by the equilateral pinnae and pinnules and the broad segments. In the indusial character it resembles the next species, which, however, is quite different in habit and pubescence.

10. D. KARWINSKYANA (Mett.) O. Ktze. [For synonymy see C. Chr. Ind. 292. 1905.]

A remarkable, finely cut species. The whole leaf is densely clothed with unicellular, cylindrical, short hairs. The indusium is large and conceals perfectly the sporangia. Known from Mexico, Guatemala, and Nicaragua.

COPENHAGEN, MAY 1911.

Botrychium Jenmani in Cuba

R. C. BENEDICT

The genus *Botrychium* is very widespread in the tropics as well as in temperate regions, but, to judge from herbarium collections, in the tropics, the species are uncommon. *B. Jenmani* Und., as originally described and as treated in the North American Flora (Vol. **16**: part 1), was based entirely on Jamaican material. Now, however, Cuba may be added to its range by reason of a recent collection made by Dr. J. A. Shafer, in February of this year, between La Perla and Santa Ana, in the province of Oriente. (*Shafer no. 8626*, Feb. 11, 1911.)

The plants collected were just in a mature fruiting condition, some of the sporangia having opened, the others still closed but full-sized. In Jamaica the fruiting period appears to range from late December to April, just about six months earlier than the fruiting season of *B. Underwoodianum* Maxon, the related Jamaican form. These two species form one of the several interesting pairs of *Botrychium* species, which occur in widely separated regions, and include in each locality two forms more or less alike in form and cutting but differing in the time of fruiting.

In Jamaica the pair comprises, as just noted, *Botrychium Jenmani* and *B. Underwoodianum*. In the southern United States a similar pair exists in the case of *B. biternatum* (Lam.) Und., and *B. alabamense* Maxon, fruiting in the early spring (February to April) and in the early fall (September), respectively. In California, *B. silaifolium* Presl and *B. californicum* Und. appear to constitute a similar pair, with *B. californicum* the earlier species. Now recently it has been suggested by a writer in the Fern Bulletin that there is here in the Eastern States a similar difference between *B. silaifolium intermedium* and *B.*

obliquum, the latter being said to be at least a month later in the same locality.

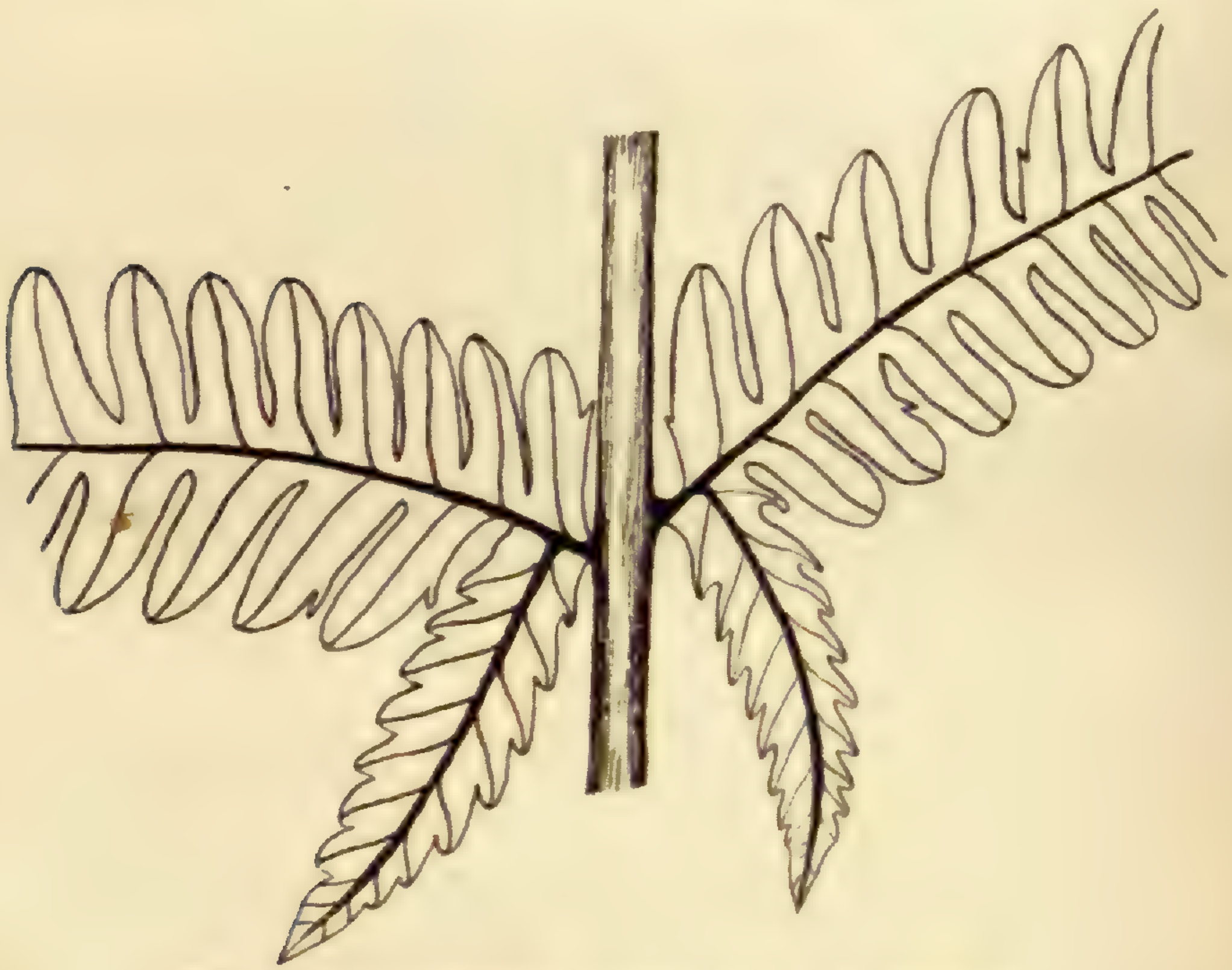
The explanation of the relationships of the extremely puzzling forms in the *Botrychium ternatum* group, here recognized as species, is not a simple one from our present knowledge of these plants. It is comparatively easy to arrange most of them in an evolutionary scheme, recognizing geographic distribution and consequent climatic difference as two chief causes of variation. This explanation, however, clears up only a part of the difficulty, and what remains is the more perplexing. More facts are needed regarding the habits, fruiting periods, and form variations. From the present knowledge, it appears to the writer that most of the distinct forms are deserving of the rank of species. It may be that new evidence, especially if discovered by experiment, will make a considerable change in our conception of these plants. The most promising field would appear to be along the line of pedigree cultures, but unfortunately it still remains to be discovered how these ferns may be raised from spore to adult condition.

COLUMBIA UNIVERSITY.

A new variety of the cinnamon fern

LEWIS S. HOPKINS

In a lot of material secured by exchange last fall from Henry W. Merrill, of Hiram, Me., were some cinnamon ferns, which differ very materially from the ordinary form. Mr. Merrill also lent me further material for study from the same locality, Oxford county, Me.



OSMUNDA CINNAMOMEA AURICULATA L. S. Hopkins

Since, so far as the writer knows, this form never has been described, the following name is proposed for it:

Osmunda cinnamomea auriculata var. nov.

First pinnule on lower side of pinna 2–10 cm. long and 0.5–1.25 cm. wide, more or less regularly pinnatifid, serrate, or dentate, sometimes attached so close to the rachis as to appear to be secondary pinnæ, the apex acuminate or acute; occasionally the opposite upper

or second lower pinnule somewhat elongated; pinnules of entire frond more or less dentate-serrate; otherwise as the type.

Open woods, "Spring's Field," Hiram, Me., Aug. 1, 1910; wet roadside "dikes," Sebago, Me., Sept. 4, 1910.

It might be added that Mr. Merrill further states that the whole frond shows a tendency to "ear" but that the variation is most marked in the middle third.

PITTSBURG, PA.

A list of the ferns found in the vicinity of Ohio Pyle, Pa.

LEWIS S. HOPKINS

The little village of Ohio Pyle lies in the southeastern part of Fayette county, Pa., where the Youghiogheny river has cut its gorge down through the lower Carboniferous. The river tumbles over a ledge of the upper Devonian, ordinarily spoken of as the Catskill Conglomerate, making a picturesque fall of some 15 or 20 feet. The whole gorge is beautiful and hundreds of tourists, attracted by its charm, visit the spot each year.

A "Symposium of Eastern Botanists" was held here during the Fourth of July week, 1905. This symposium included representatives of the Torrey Botanical Club, the Botanical Society of Washington, the Philadelphia Botanical Club, and the Botanical Society of Western Pennsylvania.

The region contains many plants of interest to the general botanist as well as the fern student, and since so far as is known no list of the flora was ever published, it may not be out of place to include a few other plants with the ferns.

Although the writer has twice visited this most interesting place and either seen or collected most of the plants

mentioned, he is indebted to Dr. O. E. Jennings, of the Carnegie Museum, for most of the data contained in this list.

Rhododendron maximum is abundant. *Erigeron pulchellus*, in flower in May and June and probably earliest flowering of our asterlike plants, occurs mainly on rocks in the mountains.

Azalea arborescens occurs along the sandy banks of the river around the bend below the falls, this marking practically the northern limit of the species. *Azalea canescens* and *A. nudiflora* both occur in the uplands above the river valley. *Ionactis linariifolia* is found in the crevices of the rocks in the river bed above the falls. *Marshallia grandiflora* occurs along the sandy river bank below the falls, together with *Azalea arborescens*, this being nearly its northern limit. *Pyrularia pubera* occurs in the woods near the Fern Cliff Hotel, this also marking almost its northernmost distribution.

The list of pteridophytes includes thirty-seven species and varieties, most of which are rather abundant. The list follows:

1. *Botrychium virginianum* (L.) Sw.
2. *Botrychium obliquum* Mühl.
3. *Osmunda regalis* L.
4. *Osmunda cinnamomea* L.
5. *Osmunda Claytoniana* L.
6. *Adiantum pedatum* L.
7. *Pteridium aquilinum* (L.) Kuhn
8. *Asplenium pinnatifidum* Nutt.
9. *Asplenium platyneuron* (L.) Oakes
10. *Asplenium trichomanes* L.
11. *Asplenium montanum* Willd.
12. *Athyrium angustifolium* (Michx.) Milde
13. *Athyrium acrostichoides* (Sw.) Diels
14. *Athyrium filix femina* (L.) Roth
15. *Polypodium vulgare* L.

16. *Camptosorus rhizophyllus* (L.) Link
17. *Polystichum acrostichoides* (Michx.) Schott
18. *Polystichum acrostichoides* var. *incisum*
19. *Dryopteris noveboracensis* (L.) A. Gray
20. *Dryopteris thelypteris* (L.) A. Gray
21. *Dryopteris cristata* (L.) A. Gray
22. *Dryopteris Goldiana* (Hook.) A. Gray
23. *Dryopteris marginalis* (L.) A. Gray
24. *Dryopteris intermedia* (Mühl.) A. Gray
25. *Dryopteris phegopteris* (L.) C. Chr.
26. *Dryopteris hexagonoptera* (Michx.) C. Chr.
27. *Cystopteris fragilis* (L.) Bernh.
28. *Cystopteris bulbifera* (L.) Bernh.
29. *Dennstaedtia punctilobula* (Michx.) Moore
30. *Onoclea sensibilis* L.
31. *Equisetum arvense* L.
32. *Equisetum hyemale* L.
33. *Lycopodium lucidulum* Michx.
34. *Lycopodium obscurum* L.
35. *Lycopodium complanatum* L.
36. *Lycopodium tristachyum* Pursh
37. *Selaginella apus* (L.) Spring

The mountain spleenwort occurs rather plentifully on the cliffs below the falls on the right side of the river, while the pinnatifid spleenwort occurs on the same side of the river just a few feet below the falls, and also about one-half mile up and on the right bank, going up, of Meadow Run, a small stream flowing into the river a short distance below the falls.

PITTSBURG, PA.

Southern California fern notes

GEORGE L. MOXLEY

May 30, 1911, in company with my son, I went into the Little Santa Anita canyon in quest of *Cystopteris fragilis* (L.) Bernh. and such other ferns as we might find. We went at once to the station I had discovered two years earlier for *C. fragilis* and found the fern quite plentiful and in good condition. I gathered quite a quantity.

Then determining upon following the canyon part way down, instead of keeping to the trail, we found in less than a quarter of a mile, just below a large clump of *Woodwardia radicans* (L.) Sm., which was growing plentifully on the side of the mountain, a number of clumps of *Adiantum pedatum* L., a fern that I did not know was gro ing in this section of the country. To say that I was delighted with our find but feebly expresses my feelings.

I shall not attempt to express how I felt, but leave it to the imagination of you who have suddenly stumbled upon something that you had never seen growing in its native wilds, and did not suppose was found within hundreds of miles.

We also collected a few specimens of some of our commoner ferns and came home tired but well satisfied with the results of our trip.

LOS ANGELES, CAL.

The study of fossil ferns

F. H. KNOWLTON

On first thought it may seem that the student of living ferns has many advantages over the student of fossil ferns—and so, indeed, he has—but when a close analysis is made of the two fields the advantages appear somewhat less striking. The student of living ferns, if he collects his material in the field, has the opportunity of examining it to the minutest detail, from the ecological conditions under which it grew, its internal anatomy and development, to its frond outline, nerve characters, and fruit production. If it be worth while it may be grown artificially through its complete life cycle back to the spore-producing stage again. Yet, in spite of this seeming perfection of detail, all students well know the differences of interpretation that constantly arise. From the limits of families, genera and species, to the faintest subspecies and hybrid, there are, or may be, opposing views.

When a botanist without previous experience along these lines views a collection of fossil ferns he is very apt to say, that, beyond the fact that they appear really to be ferns, little or nothing can be done in the way of correctly placing them, even generically. But to the paleobotanist the problem is by no means so hopeless. Long experience, coupled with a knowledge of living forms, has taught him the value of characters often overlooked or subordinated in the study of fresh material. Habit, outline, and nervation are the characters that must principally be relied upon in the study of fossil ferns. For instance, the genera *Acrostichum*, *Onoclea*, *Woodwardia*, etc., have a nervation so peculiar and characteristic that they can be identified easily and readily, and a number of fossil species have been described from this

country under these genera. Fruiting specimens are always sought and are of course of the greatest value in placing fossil forms. From these characters the following genera have been determined in the later horizons with great accuracy: *Dryopteris*, *Asplenium*, *Onoclea*, *Woodwardia*, *Adiantum*, *Dennstaedtia*, *Onychium*, and many others. From their characteristic form, combined with the characters of nervation, the genera *Lygodium*, *Gleichenia*, and *Sagenopteris*, have been determined, while in exceptional cases the internal structure has been found silicified so that thin sections have been cut and studied as successfully as though it were living; such was the *Osmunda*-like form recently described by the late Prof. D. P. Penhallow.

After all have been segregated that admit of identification on the basis of characteristic outline, nervation, or fruiting character, there remains a considerable number named in accordance with what seems to be their apparent affinity or relationship. Thus, a fern having certain of the fruit characters of the living Schizaeaceae, but not agreeing with any known living species, has been called *Schizaeopsis*. This attempt at seeking for affinities among living ferns becomes increasingly difficult as we go backward in time, until ultimately a point is reached in the geological scale where the fossil ferns present are without known or obvious living representatives. Many genera—form genera, they may be called—and higher groups have been founded for forms that cannot at the time be more definitely placed, but every now and then a specimen turns up that in a moment serves to interpret one of these genera or families in its relations to the living flora. For this reason alone it is worth while to study and name all fossil ferns, whether they can be correctly allocated among living ferns or not, for the light they may throw on the evolution of the great group to which they belong, as well as for the marks they

may supply for the use of the geologist. Right here is a point likely to be overlooked by the botanist. Unless a fossil fern can be placed with reasonable biological accuracy, the botanist is rather prone to look upon its study as useless, or at least as not worth the time expended in naming, describing, and figuring it. But paleobotany has two distinct phases or fields of study, the biological and the geological, depending upon the prominence to be given to the one or the other of these subjects. The paleobotanist does the very best he can in correctly placing a fossil fern in its relation to the living flora, though not infrequently he may make mistakes, glaring mistakes; but whether he does or not is not of the slightest importance to the stratigraphic geologist so long as the fossil is from a known horizon and is clearly defined and capable of being recognized under any and all conditions. That is to say, if an important coal bed or other geological horizon has associated with it always a particular and readily recognized fern, or group of ferns, it makes not the slightest difference to the geologist whether they are correctly or incorrectly named, and they might even be referred to by number. As Prof. J. W. Judd once said: "We still regard fossils as the 'medals of creation,' and certain types of life we take to be as truly characteristic of definite periods as the coins which bear the image and superscription of a Roman emperor or of a Saxon king." It is for this reason that so many fossil ferns that have not been placed biologically, have been described in this country; for, be it known, there is no country in the world in which paleobotany has the recognized standing as an aid to geology that it enjoys in North America.

The question is often asked as to how and where fossil ferns are found. As a matter of fact, they are found from almost the most ancient rocks in which vegetation of any kind occurs on down to the present time. Long

experience has taught the paleobotanist the horizons and kinds of rocks in which they are most likely to be found; but there is no general rule, for rocks heretofore barren may today be shown to contain them in abundance. It is simply a question of searching, and no likely rocks should be passed by. As ferns for the most part are delicate in structure, only certain kinds of rocks are fitted to preserve them in any degree of perfection. Thus, a coarse sandstone or conglomerate would not be likely to retain them so that the characters can be satisfactorily made out. Fine-grained clay shale is the matrix in which they are preserved to the best advantage, and in this even the most delicate are often revealed to the minutest detail of outline, nervation, and even the spore-cases and spores.

The ferns and fernlike plants of the Carboniferous, or the great anthracite coal age, are present in wide variety and perfection. They grew in tropical profusion in and about the great, shallow, low-lying swamps of that time, and their remains, together with the remains of allied types of vegetation, fell into the water where they underwent only partial decay, the continued accumulation ultimately making up the beds of coal. That the ferns were abundant is shown by the fact that in numerous places layers of considerable thickness, compressed to the specific gravity of coal, are made up almost entirely of spores. It occasionally happened then, as may be observed about any marsh or shallow pond of today, that an especially high flood or a broken barrier of some sort admitted silt or clay in suspension, which was deposited and now forms the shale partings in the coal or layers above it. These are usually the best places to look for ferns, for as the plants are not present in such great numbers, the details can be made out more satisfactorily. The U. S. National Museum possesses a single collection, the gift of a generous patron, the late Mr. R. D. Lacoe,

of Pittston, Pennsylvania, of not far from 100,000 specimens of coal plants, a majority of which are ferns. Some of these are truly magnificent specimens, showing that there were tree ferns then existing with fronds that must have spread a dozen or twenty feet, as well as a host of smaller forms.

The digging out and collecting of fossil ferns is very interesting, not to say exciting. There is always the possibility before one that the next blow of the hammer may bring forth something new and wonderful, the like of which has never been seen by mortal eye. Perhaps it may be a wholly new type, or possibly a fruiting specimen that will settle for all time the position of a group previously unplaced. A case of the latter once fell to the lot of Mr. David White, of the U. S. Geological Survey. He was collecting Carboniferous plants at Nuttall, West Virginia, when a fortunate blow revealed a delicate "fern," since named *Aneimites fertilis*, which had seeds attached to the tips of its reduced pinnules, and on the instant a great group of supposedly true ferns was transferred to the then newly discovered group of pteridosperms, the first to be recorded for this country. Other similar discoveries had preceded and have followed this, in England and France, and now it is well known that the seed-bearing habit had been acquired by "ferns" long ages before the advent of flowering plants.

One of the most interesting experiences of the writer in collecting fossil ferns was near Cumberland, Uinta county, Wyoming. It appears that in 1843 Capt. John C. Fremont, when on one of his exploring expeditions to the Rocky Mountains, collected a handful of delicate fossil ferns from near what is now known as "Oyster Ridge." A grave dispute arose as to the geological age of the beds containing them, but they were not rediscovered until 1906, and a couple of years later the writer made a special trip to the locality. They were

found as Fremont described, in a conspicuous bed of hard white clay which runs for miles along a steep hillside. The first blow of the hammer proved that it was really the fern horizon and in feverish haste we dug out and split open the layers of clay. There were beautifully preserved and delicate little fronds of *Gleichenia* of several species, some so perfect that the characteristic forking of the fronds and the apical bud were well displayed. There was a fine large fruiting species of *Anemia*, a peculiar *Dennstaedtia* with the fruit borne on reduced pinnules, as well as a number of types without fruit. It was a fine array that we packed and shipped to Washington, where it still awaits opportunity for final study. The same association has since been found in other parts of Wyoming, but none of it has been critically examined.

Briefly recapitulated, the reasons why it it worth while to study fossil ferns are: (1) It not only adds to the sum total of knowledge, but it furnishes, or at least may often supply, valuable data on the evolutionary history of the group; (2) data bearing on the temperature and moisture, as well as on other ecological conditions, are supplied; and (3) the study affords an invaluable series of stratigraphic marks for the use of geology.

U. S. NATIONAL MUSEUM,
WASHINGTON, D. C.

Ferns of the Isthmus of Panama

GEORGE F. CLEVELAND

I have been requested by several members of the Fern Society to write an article for the new FERN JOURNAL on the ferns of the Isthmus of Panama. I will begin by saying that I have practically no knowledge of the genera or species of the tropics, and my time is somewhat

GATEWAY AND WATCH TOWER AT FORT SAN SEBASTIAN, PORTO BELLO, PANAMA

limited. I am very glad, however, to do what I can to help along our new official publication. The following notes will be mainly descriptive, and divided under the headings of locality, geological conditions, and atmospheric conditions.

I am located at Porto Bello, Panama, which is about twenty miles from the Canal Zone proper, and presents some considerable differences in vegetation from the Canal Zone. The flora of this section is somewhat restricted in species, owing probably to its proximity to

the sea, to its comparatively low elevation, the character of the soil, and excessive moisture. The place is famous in song and story as the point of departure of the Spanish treasure ships carrying the gold, silver, and precious stones of Peru to Spain, also as the scene of the desperate raids of the buccaneers, particularly of Morgan and Drake. Ruins of the old Spanish buildings and fortifications are still standing, and show a wonderful state of preservation considering the severe climatic conditions and the abuse and neglect to which they have been subjected.

The region that has come under my observation comprises a hilly country on both sides of a long and narrow bay and low swampy lands at the head of this bay. The country is covered with virgin forest which forms an almost impenetrable jungle, and this, added to the precipitous nature of the hills and the treacherous character of the swamps, makes extensive collection or observation very difficult.

Geological conditions: Geologically, this region is primitive in the extreme, being composed mainly of irregular and scattered chains of ragged, precipitous hills, thrown together and jumbled into a tangle which follows neither scheme nor direction, and is composed exclusively of basalt. They appear to have been thrown up by some terrific volcanic disturbance, and boiled and seethed, the short line in many places showing folds and bubblelike formations, resembling nothing in the world so much as melted sugar poured on ice. This rock formation is of a very high degree of hardness and homogeneity, though veins of quartz and feldspar occasionally occur.

As would be expected, in a locality with an excessive rainfall, the surface has been modified by erosion and weathering, though to a surprisingly small degree, owing to the great hardness of the rock. There occur also deep

deposits of a heavy red soil, due largely to the rapid decay of the dense tropical vegetation.

The climatic conditions—due largely to the comparatively low and narrow strip of land separating the Atlantic from the Pacific, allowing a meeting of air currents from two oceans, combined with a comparatively high temperature—produce a tremendous evaporation and precipitation. The temperature is very constant; it seldom if ever goes below 72° Fahrenheit or above 95°. These conditions produce a vegetation which is dense and luxuriant, though for some curious reason which I have been unable to discover, it is rather lacking in variety, and there is a noticeable scarcity of flowers. Ferns are in abundance, growing everywhere and in all kinds of situations, apparently without regard as to whether it is rock, soil, or tree trunk. I have found plants of a species of *Polypodium* growing on rocks on the seashore which during heavy winds would be covered by breaking surf, and the same species growing on trunks of trees on the summits of the highest hills, seemingly equally at home in either situation.

Although they grow in such profusion, I have been astonished and disappointed in the few species I have been able to discover, probably not over thirty in all. Most of the species so far discovered seem to fruit freely, and many of them also propagate freely by means of adventitious buds, yet of two or three species, out of hundreds of plants examined, I have been unable to find one single fertile frond.

In another article I will endeavor to give some detailed information concerning the more noticeable species and genera, with possibly some drawings or photographs.

CRISTOBAL, C. Z., PANAMA.

Cyrus Guernsey Pringle

HAROLD GODDARD RUGG

The botanical world has lost a well-known personage in the death, May 25, of Cyrus Guernsey Pringle. Born in Charlotte, Vt., May 6, 1838. Dr. Pringle had made Vermont his home for nearly all his lifetime. Dr. Pringle was best known perhaps as a collector, and his herbarium of 100,000 specimens, now located at the University of Vermont, is extremely rich in rare material. His collecting trips led him to Arizona, California, Oregon, Washington, and especially to Mexico, where he was official collector for the Mexican government. Since 1885, when this country had been suggested to him by Dr. Asa Gray, it had been his special field. His winters were spent in collecting material, which was sent to Vermont and there examined and distributed to various herbaria throughout the world.

The late Mr. George Davenport had begun the study of ferns in 1873 and had written to Dr. Pringle to search for *Woodsia glabella* R. Br. It had been found once in Vermont, at Lake Willoughby. Dr. Pringle states that when he started on his search for this rare plant he did not know a single fern, but gradually he collected all the ferns known to Vermont. In 1876 he made his first trip to Mt. Mansfield—that most wonderful, to the botanist, of all Vermont mountains—and was rewarded by finding *Aspidium fragrans* (L.) Sw., never previously reported from Vermont, and *Asplenium viride* Huds., never before found in the United States. Later in the year of 1876 he went to Willoughby, and among the specimens collected there, which he sent to Professor Eaton for verification, were *Woodsia alpina* (Bolton) S. F. Gray, and another fern new to the flora of the United States. From 1874 to 1897 he collected all but thirty-six of the then known

one hundred and sixty-five species of North American ferns and sent home for determination sixteen new species.

For many years he had been vice-president of the Vermont Botanical Club, and it was indeed a treat to meet and to converse with this quiet, genial, unassuming man at the meetings of the Vermont Club. He was always ready and willing to show his specimens even to the uninitiated. His many friends throughout this country and Europe will regret to learn of his death.

HANOVER, N. H.

The field meeting at Hartford

E. J. WINSLOW

The meeting of Fern Society members announced in the April FERN JOURNAL took place on June 16, 17, and 18, when ten members from various parts of New England and New York met for field work in Hartford, Conn., and vicinity. The members who arrived at noon on the 16th were taken in charge by Mr. Henry Bigelow and conducted by steam and trolley to the forests of Plainville. Here a very brief exploration disclosed a list of twenty-five species of ferns, including *Dryopteris Goldiana*, which is rare in this region, *Botrychium simplex*, and *B. lanceolatum*. Here also were found three hybrids of *Dryopteris*.

On this trip a short call was made to inspect the fern garden at Mr. Bigelow's home, in New Britain, where such rare species as *Asplepium montanum*, *A. pinnatifidum*, *Scolopendrium vulgare*, and many others were seen growing vigorously. But most interesting of all was a remarkable plant of *Asplenium ebenoides* with several fronds nearly a foot long. Mr. Bigelow is evidently a master of the rather difficult art of making ferns grow.

On Saturday morning an early start was made for the shores of Farmington river, near Rainbow, under the guidance of Mr. C. H. Bissell and Mr. Bigelow. Other members of the party were Mrs. Orra P. Phelps, Miss Annie Lorenz, H. G. Rugg, R. C. Benedict, J. Francis Huss, and E. J. Winslow. The ground explored was a moist woodland along the river. Among the finds were a large number of plants of *Botrychium lanceolatum*, *Lycopodium obscurum* and the variety *dendroideum* growing near together and with some intermediate forms, a form of *L. complanatum* with second year growths starting from the tips of the branches, *L. inundatum*, a number of plants of *Dryopteris cristata* × *marginalis*, and *Cystopteris bulbifera*.

The return to Hartford was made early enough for a visit to the fern garden on the Goodwin estate. This garden is one of the largest and finest in America and it is hopeless to attempt to describe it in a brief paper. There were all the species of ferns native to this part of the country whose presence could add anything to the beauty of the garden, including many rare forms and hybrids, also a large number of foreign species, and all the freak varieties of *Athyrium filix femina* about which we read in descriptions of English ferneries. Many of these species were to be seen in all stages of development from the prothallium. The visitors were especially enthusiastic over two plants of a strange *Osmunda*. These plants are apparently somewhat intermediate between *O. regalis* and *O. Claytoniana* but totally unlike any fern that had ever come within the experience of any of the party. Mr. Huss, who has charge of the garden, said that these plants were found growing wild near Hartford and had been growing in the garden several years. By the courtesy of Mr. Huss, one of the visiting members was allowed to take two fronds for more careful study

and we shall doubtless hear from it again. In the meantime it would be well to watch the Osmundas.

President Dowell arrived Saturday evening, and Sunday morning Dr. E. H. Thompson and Mr. Wm. B. Rossberg joined the party on a trip by trolley to a point in the town of Cromwell and thence on foot across country to East Berlin, a distance of three or four miles. The feature of this excursion was the finding of a great abundance of *Lygodium palmatum*. To those accustomed to regard this plant as a rarity, it was a cause of great surprise to find the young plants springing up in profusion over a territory of several acres in extent. This fern has the distinction of being a subject of legislation. Collecting it is forbidden by the laws of Connecticut.

Among the interesting flowering plants collected during the meeting were *Conopholis americana*, *Liparis liliifolia*, and *Viola emarginata*.

The success of the meeting was greatly enhanced by the efforts of Messrs. Bissell and Bigelow, who very faithfully looked after the welfare of the visiting members.

Aside from the interest that attached to the opportunity to see the several rare ferns visited, the most satisfactory feature of the meeting was the chance afforded those present to get acquainted with each other. Most all were only partly acquainted through correspondence, and the opportunity of getting together and talking over matters of mutual interest was very enjoyable. It is suggested that similar meetings be held in other sections of the country.

AUBURNDALE, MASS.

Notes and news

In Notulæ Systematicæ **1**: 234. 1910, Dr. H. Christ has described a new *Dryopteris*, *D. tremula*, from Mexico, state of Michoacan. Recently I have had numerous specimens of this fern of the type collection (Herb. Roland Bonaparte) and I believe that it cannot be separated specifically from *D. thelypteris*. If I am correct in this, the finding of this species in southern Mexico is most interesting, *D. thelypteris* not having been found previously in tropical America.—C. CHRISTENSEN

The following members of the American Fern Society were present at the meeting of the Vermont Botanical Club, held at Brandon, Vermont, July 6 and 7: C. H. Bissell, Southington, Conn.; Dr. E. Brainerd, Middlebury, Vt.; D. Lewis Dutton, Brandon, Vt.; Mrs. Nellie F. Flynn, Burlington, Vt.; Dr. Tracy Hazen, New York City; F. T. Pember, Granville, N. Y.; Harold G. Rugg, Hanover, N. H.; Miss Mabel Strong, Woodstock, Vt., and Mrs. Emily Hitchcock Terry, Northampton, Mass. The excessively warm weather prevented others from attending.

The rarest fern found was *Woodsia glabella* R. Br., collected on Mt. Horrid, at an elevation of about 2,500 feet. A fine station for *Dryopteris Goldiana* (Hook.) A. Gray and *Asplenium angustifolium* Michx. was visited. Dr. Hazen was successful in getting some *Dryopteris* hybrids.

A forward step in the conservation of Missouri's resources has been taken by the University of Missouri in the appointment of Professor J. A. Ferguson, of State College, Pennsylvania, to the position of Professor of Forestry in the College of Agriculture. Professor Ferguson is a graduate of Yale Forestry School, and has for

nearly two years been head of the Department of Forestry at State College, Pennsylvania.

The College of Agriculture owns fifty thousand acres of forest lands in the southern part of Missouri. It is planned to utilize these lands as an outdoor laboratory for the instruction in practical forestry. It is probable that a portion of the forestry instruction will be given on these forest lands. A large number of applications for forestry instruction are already on file and it is anticipated there will be a large enrollment of students at the beginning of the university year.

It may not be out of place to remind members of the Society that under Sec. D plants other than cut flowers may be sent by express at the rate of two ounces for one cent provided the charges are prepaid.

Local agents and drivers, as a rule, are densely ignorant of this rate, and their rulings as to rates always favor the express companies. However, interstate commerce laws provide that a schedule of rates be kept on file and open to the public, and if members will avail themselves of the privilege of examination, they will find the rates as given above.

Since ferns are plants and are not cut flowers, they are clearly entitled to this rating. –SECRETARY.

Mr. Harold G. Rugg, Hanover, N. H., offers to members of the American Fern Society specimens of *Adiantum bellum* from Bermuda for postage.

Now that we are in the middle of the collecting season, it is to be hoped that the herbarium of the American Fern Society will be well remembered by collectors. Contributions to the herbarium will be thankfully received and highly appreciated by the curator, Prof. L. S. Hopkins. Lincoln H. S., Pittsburg, Pa.

A revision of the constitution of the American Fern Society has been under consideration and has been dis-

cussed for some time, a few years at least. At the beginning of the present year it was considered best not to take any definite action immediately, in view of the fact that some changes had already been made in the policy of the society. But by this time a few changes and additions in the constitution should be made so as to define more closely the duties of some of the officers, to provide for the publication of the official organ of the society, annual reports, or other matters. Perhaps it would be better to have the officers serve a longer term and avoid having the elections recur so often. The president has appointed Mr. Robert A. Ware, 246 Devonshire street, Boston, Mass., as chairman of a committee to consider this subject of revising or amending our constitution. Mr. Ware would like to have members think over this matter and write to him, stating their views or offering suggestions, more especially on matters not provided for by the constitution.

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CONTENTS

Notes of a naturalist afloat—I (Plate 5)
WILLIAM EDWIN SAFFORD 121
Notes on the ferns of the Isle of Pines, West Indies
OTTO E. JENNINGS 129
An interesting find ..... HAROLD W. PRETZ 137
Lycopodium flabelliforme ..... E. J. WINSLOW 141
Edward Palmer ..... WILLIAM EDWIN SAFFORD 143
Grace A. Woolson ..... EMILY HITCHCOCK TERRY 148
Notes and news 149
Index to volume I 151

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American Fern Journal

Vol. 1 OCTOBER 1911 No. 6

Notes of a naturalist afloat—I

WILLIAM EDWIN SAFFORD

(Plate 5)

The private log of a youngster alive to the beauty of nature and enthusiastic in the study of her works, is apt to abound in hyperbolic descriptions of the sea and sky and shore. It is with mingled feelings of amusement and regret that I sometimes look over the records of my early cruises and find in them the picture of the boy I used to be. Much that I wrote might, perhaps, have better been left unwritten; but occasionally I come across the account of an expedition or an experience which I think may be worth keeping.

My first cruise was in the old *Powhatan*, an archaic side-wheel man-of-war, which had served Commodore Perry as flagship while he was making his memorable treaty with Japan. We made a trip to the Isthmus of Panama in the spring of 1881, carrying with us a relief crew and officers for the U. S. S. *Alaska*, then on the Pacific station. In crossing the Isthmus I took notes on the vegetation, especially on the ferns and palms, which may be of interest to the general reader as well as to the botanist unfamiliar with the tropics, though they doubtless contain little that is new. Many of the plants I saw could not be determined at the time, but afterwards I supplemented my notes with information obtained from the published reports of scientific expeditions, as well as from other sources.

[No. 5 of the Journal (1: 93-120) was issued 7 Au 1911.]

ACROSS THE ISTHMUS OF PANAMA

The *Powhatan* came to anchor in Aspinwall harbor, on the north side of the Isthmus, at nine o'clock on the morning of April 4, 1881, having made the passage from New York in eleven days. The water was green as a catbird's egg, in sharp contrast to the deep indigo of the Caribbean sea, through which we had just been steaming. The town of Aspinwall (or Colon) looked rather picturesque from our anchorage, with several white buildings surrounded by balconies and galleries and a line of native cottages beneath crested coconut palms; but we found the streets very dirty and ill-smelling when we went ashore. The island on which the town is built is very little above the sealevel and the greater part of it was at that time a brackish swamp. All the fresh water was hauled by the railroad into the town, and it was apparent from the looks of the natives that they did not waste it in washing. The great majority of those we saw were negroes or mulattos, including the prefect, who visited our ship with his staff and received a salute of thirteen guns.

My first walk was along the beach to the right, where after some time I came to a mangrove swamp, the first I had ever seen. In the marshy ground there was first of all a dense growth of a coarse, simply pinnate fern, with the upper pinnæ fertile and cinnamon-colored. This proved to be *Acrostichum aureum*, a species found in tropical marshes all over the world. Near by there was a great lagoon into which the town of Aspinwall was drained. It was said to be the resort of alligators, but I saw none. I did, however, see a crested iguana, a lizard, which it is said the natives eat with relish.

About the margin of the swamp was a dense thicket of bushes and small trees, some of which were propped up on arched aerial roots above the level of high tide. The foli-

age of this species was smooth and glossy and the pendent fru t, cigarshaped or fusiform, had in some cases begun to sprout while still hanging on the limbs. This proved to be *Rhizophora mangle*, the most common mangrove of tropical shores. Another species had olive-like leaves, white beneath, and clusters of small inconspicuous flowers. It was without the arched roots of the species just described, but it sent up from out the mud peculiar fingerlike vertical breathing roots. This proved to be *Avicennia nitida*, also a widely distributed species. Perched among the branches of the mangroves were herons and egrets, gray and white, and swarming among their roots were myriads o crabs, most o them with one great claw, which they held up in a menacing attitude.

On boarding the train to cross the Isthmus I met several French engineers, from whom I got a good deal of interesting information regarding the construction of the proposed canal. They had been on the Isthmus a little more than a month, having been among the first to arrive, the latter part of February. Little had as yet been accomplished. A trail had been blazed through the forest, and some excavation had been made at a p ace called Paraiso. It was hoped that the canal would be finished by 1888. It was to be a sealevel canal, fifty-four miles long, without locks, but with tida gates at the Panama end. The greatest excavation would have to be at Culebra, where the line crosses the watershed.

The track at first skirted the shore, with the sea on our right and a swamp on our left. We soon came to the mangrove thicket of which I have spoken, and crossed a viaduct spanning an inlet from the sea.

Along the track grew thickets of bananas and p antains, above which towered lofty palms, some of them clothed with hanging ferns (*Nephrolepis biserrata*). Among the most striking of the palms was *Attalea cohune*, here called "corozo," with a lofty trunk and a crown of

large pinnate leaves like drooping plumes. Below them hung the petioles of dead leaves and great clusters of fruit, from which oil is made. The fruits resemble large acorns in form and contain hard, wrinkled kernels which in Mexico are called "coquitos de aceite." Those of an allied species are burned in Brazil for smoking rubber.

Another oil-yielding palm, called "corozo colorado" on the Isthmus, is *Elaeis melanococca*, a species growing in marshy places, with low creeping trunk and enormous pinnate leaves; the fruits are smaller than those of the preceding species, of a bright red on the outside and with a small hard nut. Both the husk and the nut yield oils, but of different kinds. The fruits are crowded in compact clusters from which the hard pointed tips of the floral branches project.

Acrocomia sclerocarpa, called "chunga" on the Isthmus, is the macaw palm or "grigri" of the West Indies. It is closely allied to *Acrocomia vinifera*, which in Central America is called "coyol," and yields a sugary sap from which wine, or toddy, is fermented. The fronds of this species are pinnate but the pinnæ do not all lie in the same plane. The spathe is armed with spines, the fruit is smooth and globose, and the trunk is marked with the scars of the petioles and armed with needlelike spines.

Oreodoxa regia, usually called the royal palm, is one of the most stately and beautiful on the Isthmus, with its smooth columnar trunk and crown of pinnate leaves. The name "palma real," or royal palm, is given to several other species, and should not lead to confusion. Sometimes it is applied to the "corozo" (*Attalea cohune*).

In addition to the palms already described, I may mention *Iriartea exorrhiza*, a slender-stemmed, pinnately-leaved species with its base propped up above the ground by straight inclined roots like those of a pandanus. The surface of the roots is roughened with sharp projecting tubercles, and they are used for grating the meat of ripe

coconuts. On this account, this species is sometimes called the "rasp palm."

Among the dwarf palms of the Isthmus are species of *Chamædorea* and *Geonoma*, some of which have remote lanceolate pinnæ, with the terminal pair suggesting the forked fin of a fish's tail. The young inflorescences of certain species of *Chamædorea* are eaten in Central America and Mexico, and are there known as "tepejilote" ("green corn of the mountains," or "wild roasting ears").

Another small palm, armed with needlelike spines, is *Bactris minor*, sometimes called "caña brava" by the natives and "prickly pole" by the West Indian negroes on the Isthmus; and on the edges of the woods there is a climbing palm, also very prickly (*Desmoncus oxyacanthos*), called "matamba" by the natives, who use it for decorating their altars and for making garlands.*

On the edge of the openings in the forest, trailing over the bushes, grows a pretty climbing fern, *Lygodium radiatum*, with fronds having three to seven segments. The accompanying figure (PLATE 5) was drawn by Mr. Theodore Bolton from specimens of the original collection made on the Isthmus by Dr. Sutton Hayes, one of the most enthusiastic collectors who ever visited this region.

The number of climbing and epiphytal ferns in the woods is remarkable. Among the former was the very common *Polypodium polypodioides* (*P. incanum*), *Polypodium percussum*, with entire linear-lanceolate fronds, *Stenochlæna japurensis*, and a species of *Asplenium* with falcate pinnæ, probably the recently described *A. falcinellum* Maxon. Among the epiphytes were a species of *Nephrolepis*, closely allied to our common Boston fern,

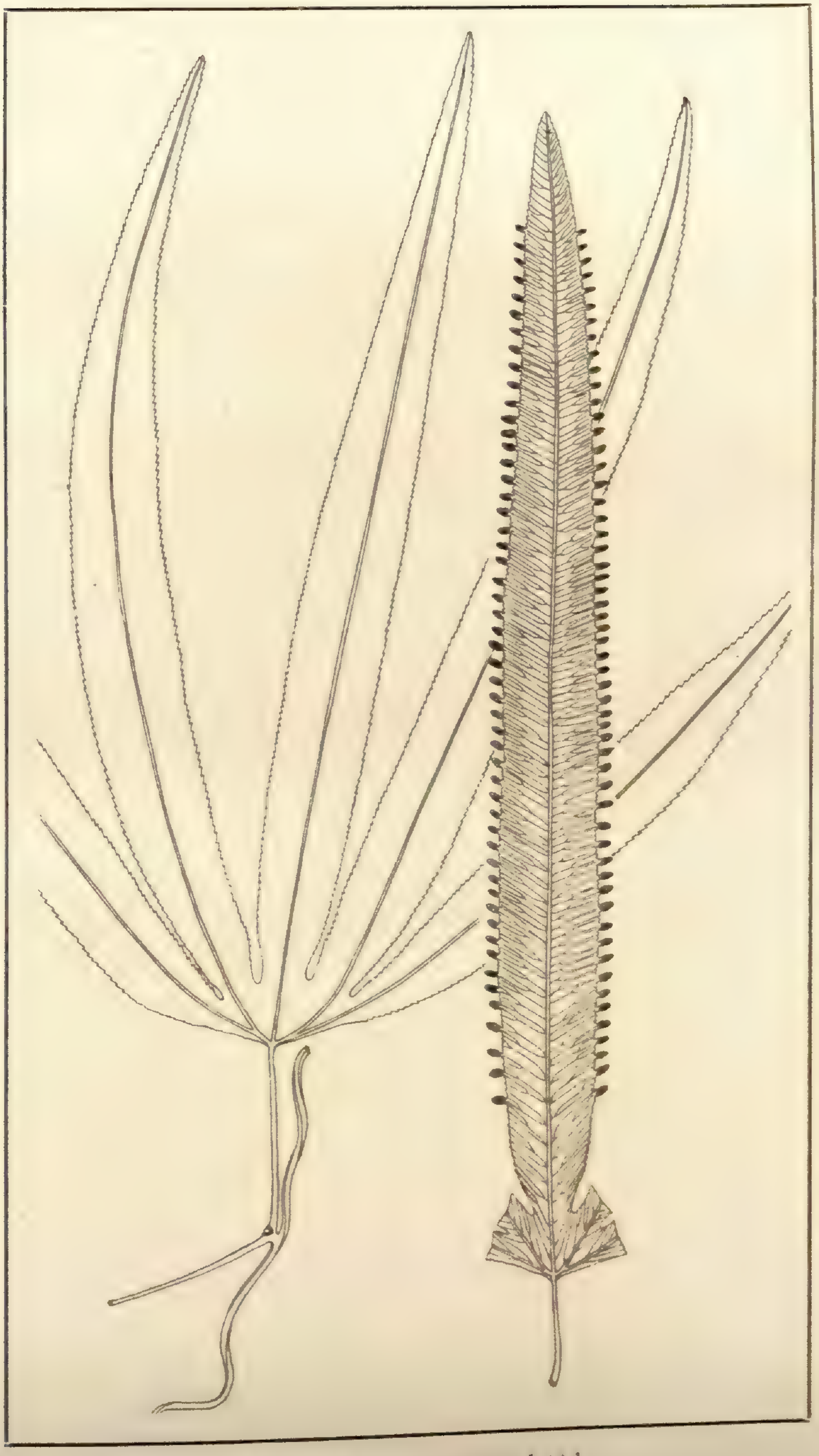
*For an account of the vegetation of the isthmus, see Seeman's Flora of the Isthmus of Panama, in the Botany of the Voyage of the Herald, 1852–57, from which most of the names given above are taken.

with simply pinnate pendent fronds six to eight feet long, growing on the trunks of palm trees. A species of *Elaphoglossum* (*E. Herminieri*) was remarkable for its long, pendent, ribbonlike fronds growing from a basal tuft of fulvous hairlike scales. Species of *Vittaria* resembling tufts of grass grew on the limbs, and several species of *Campyloneurum* were distinguishable by the transverse rows of sori dotting the lower surface of their lanceolate fronds. *Asplenium serratum* with enormous simple fronds, closely resembling *Asplenium nidus*, which I afterwards collected in Polynesia, was common on the limbs of trees, where it perched like huge birds' nests.

A simple-fronded species, first described from the Isthmus, was *Dictyoxyphium panamense*, with the sori in a continuous line bordering the swordshaped fronds. Other terrestrial species were the common *Blechnum occidentale*, *Diplazium grandifolium*, the beautiful "silver fern" (*Ceropteris calomelanos*), and *Adiantum lucidum*, with simply pinnate fronds resembling somewhat those of our common Christmas fern. Perhaps the most beautiful of all was *Asplenium formosum*, growing on shaded rocks in water courses, with fronds similar to those of *Trichomanes*.

I must not forget to mention *Salpichlæna volubilis* (*Blechnum volubile*), a climbing species with enormous bipinnate fronds, comparatively remote lanceolate sterile pinnules, and narrower fertile ones. Several tree ferns are said to occur on the Isthmus; the common species of the canal zone is *Hemitelia petiolata*.

Among the lianas of the forest were species of *Bignonia* with bright-colored trumpetshaped flowers, and a *Bauhinia* with a peculiar flattened zigzag stem like the "monkey ladders" of Brazil. There were also strange-looking Clusias with aerial roots like those of a banyan. Among the common weeds was the sensitive plant (*Mimosa pudica*), which sometimes bordered the track for stretches of a mile or more.



Lygodium radiatum Prantl, × ½

The town of Chagres presented a novel appearance with its small square houses of bamboo. The eaves of the steep roofs thatched with palm leaves projected about three feet beyond the sides of the houses, thus sheltering the thin walls from the rain. Around the thresholds swarmed pigs, goats, dogs, and naked children, the latter with their bellies distended from eating great quantities of bananas. We saw a number of handsome cattle, resembling Jerseys or Alderneys, but with longer horns.

As we skirted the banks of the Chagres, we pictured to ourselves the flotilla of boats in which the English buccaneers with Morgan at their head ascended the river, on their way to destroy the city of Panama, in 1671.

At intervals we passed little huts marked with the names of the various "brigades" or surveying parties. At many places we were besieged with girls and women offering the passengers coconut candy, coconuts, oranges, bananas, hard-boiled eggs, and bread, for sale at prices higher than they could be bought for in New York City. We were now approaching Culebra, the highest point of the route of the canal, where an enormous cut, almost three hundred feet deep, would have to be made. Beyond this point, on the Pacific side of the ridge, the aspect of the vegetation changed, and there was evidence of a marked dry season. Among the most striking features of the vegetation were low spreading bipinnate-leaved acacias and columnar cacti (*Cereus* sp.). the edible fruit of which is called "pitahaya;" and we saw quantities of flat-jointed prickly pears (*Opuntia* sp.).

There are two marked seasons at Panama. The dry season, from December to April, is usually called summer (*verano*). The rainy season, from May to November, is called winter (*invierno*); but about the middle, or latter part of June (St. John's day) there is a short interval of good weather called the "little summer of San Juan." During the dry season the prevailing winds are

from the north. A great deal of the moisture is precipitated by the mountain chain, which forms the backbone of the Isthmus, and the water flows back to the Atlantic through the Chagres and other streams. At the time of our visit, there was considerable sickness on the Isthmus. The most dreaded disease was known as Chagres fever. The French were already constructing hospitals, however, and doing what they could to establish sanitary conditions. We heard afterwards that the principal engineer on the Isthmus, M. Blanchet, who was in charge of the excavations at Culebra, succumbed to the effects of the climate and died before the close of the year.

There is not space here to describe the city of Panama of that time, with its ruins covered with mosses and ferns, its stately cathedral, its market filled with monkeys, screaming parrots, and strange fruits, its money-changers with prehistoric pottery and golden objects from Chiriqui for sale,* its shops where hammocks of the finest quality and beautiful Panama hats are sold, and in some of them pearls from the neighboring pearl fisheries, at prices higher than in New York. One of the most beautiful things we saw was a large terrestrial orchid called "flor del Espiritu Santo," the fragrant flower of which had at its center what looked like a pure white dove with its wings outspread. Its botanical name is *Peristeria elata*.

Before leaving we drove to the top of Ancon hill, behind the city, on which the hospital of the French nuns, of the order of St. Vincent, was afterwards established. From this place we had a beautiful view of the city, with its twin-roofed cathedral and the harbor with its green islets and the men-of-war at anchor. We also took a walk on the sea wall, a part of the ancient fortifications of the city, from which we saw the great bare reef left

*See Holmes, W. H. The Use of Gold and Other Metals among the Ancient Inhabitants of Chiriqui, Isthmus of Darien. Bull. U. S. Bur. Ethnol. **3**: 1–27. *f. 1-22.* 1887.

by the receding tide, which made it impossible for ships to approach within easy distance of the city. In the sky flocks of frigate birds and pelicans were sailing, the former with the grace of eagles, the latter like clumsy clown dogs in a circus, imitating the motions of skilled actors, but imitating them very successfully. It was with great regret that we left the interesting old city and returned to Aspinwall.

On the 9th of March we got under way and headed for Key West.

3339 MT. PLEASANT ST.,
WASHINGTON, D. C.

Notes on the ferns of the Isle of Pines, West Indies

OTTO E. JENNINGS

In connection with a natural history expedition from the Carnegie Museum, t became the good fortune of the present writer to devote most of the month of May, 1910, to botanizing in the Isle of Pines, West Indies. A report embodying the botanical results of the expedition will eventually be presented for publication in the Annals of the Carnegie Museum, but it has been suggested that a brief account of the expedition relative to the ferns seen and collected might be desirable for the AMERICAN FERN JOURNAL. With this in view, this article was written.

The Isle of Pines lies about sixty miles south of the west central portion of Cuba, somewhat west of the meridian of Havana, and contains about 1,200 square miles of territory. The island consists, roughly speaking, of two islands, a north one and a south one, separated by a great swamp running east and west. The northern portion is somewhat elliptical in shape and measures about twenty miles across from north to south and thirty

miles from east to west, while the southern portion is about forty miles long from east to west and perhaps ten miles wide at its greatest north and south extent. The intervening marsh consists of the mangrove formation running in from indenting bays at the east and west, and in the middle can be waded in the dry season. Evidently the marsh is being filled in by the aid of vegetation, and eventually the two portions of the island will become united by dry land.

Topographically the island is a low-lying level plain from which rise sharply here and there broken ridges, which have a general trend from northwest to southeast. The ridges are composed of steeply inclined strata of more resistant rocks, the strata dipping to the east-northeast, so that the slopes are not generally so precipitous on that side as on the south and west. In the northern part of the island the Sierra de los Caballos reaches a height of about a thousand feet, and, like its companion ridge about three miles to the west, the Sierra de las Casas, it has quite precipitous slopes and is composed mainly of a crystalline marble. The Sierra de Cañada in the west central part of the island has somewhat more gentle slopes and, notwithstanding reports to the contrary, consists of an impure mica schist. This ridge was found by the aneroid to lack but a few feet of the height of Caballos, in the northern part of the island.

Inland the island has a gently undulating plain of probably purely subaerial erosion and reaching a height of about two hundred feet above the sea in the central part of the island. The drainage areas run in all directions radially from the central portion of the island, and have broad basins with gentle slopes. Around the northern mountains is a fine series of wave-cut cliffs at about fifty to sixty feet above the present sealevel; and from this point seaward the gently sloping plain gradually blends into the recent coastal deposits, which are occupied

practically all around the northern portion of the island by a broad belt of the mangrove formation. There appears to have been in recent times an elevation of the island sufficient to have enabled the streams to cut down steep channels, at least in the lower part of their courses, so that subsequent depression to the present level has resulted in submerging the lower courses of the rivers, thus making them subject to tide water for often eight or nine miles from the mouth. The forests of the mangrove formation have at the same time advanced upon the lower parts of the depressed plain.

The soil of the greater part of the in and plain consists of a yellowish red or brownish red gravelly clay, known as the Mal Pais Gravel. This soil is evidently residual, being derived by subaerial erosion from underlying marbles and schists. In depressions, and especially on the low plain below the contour of the ancient elevated sea cliffs, the Mal Pais Gravel is replaced by a light yellow or somewhat gray sandy loam. In the west central part around Los Indios there are considerable areas of almost pure glistening white quartz gravel and coarse sand mixed here and there with more or less iron. Towards the coastal fringe the soil becomes alluvial, being composed of varying mixtures of beach deposits and remains of vegetation.

The southern component of the island, that south of the marsh, consists, so far as is known to the present writer, of a rather uniformly level coral-limestone plain but little elevated above the sea. At Caleta Grande, along the median western portion of the south coast, where reached by the present writer, the rock is being cut away by the perpetually pounding surf, aided by occasionally terrific storms, and the jagged perpendicular cliffs are perhaps eighty feet at their greatest height. The soil on this coral-limestone plain consists of a very scanty dark loam which in places merely fills the irregular

cracks and hollows in the underlying rock.

The c'imate of the island is, of course, oceanic and quite equable. The latitude being but about twenty-one degrees north, the extreme range of the thermometer lies between about 50° and 100° F. The temperatures experienced by the writer during his sojourn on the island in May, with the sun exactly overhead at noon, were from 82° to 92° F. during the day, while at night, temperatures as low as 70° F. were rarely experienced. The temperature of the ocean water on the beaches was 80°–82° F., while a mineral spring at Santa Fé was said to register 88° F. The well and spring waters, so far as tested, ranged generally from about 68° to 80° F. as they came from the ground. The island has a dry season, with showers very rarely, from November to May, while during the latter month, or about the first of June, there begins a wet season, with torrential rains, which fill to the brim the sharply cut channels of the rivers, and flood portions of the low-lying plains.

The first ten days of our stay in the Isle of Pines was spent in the exploration of the northeastern portion of the island, with Nueva Gerona as the base of operations. Nueva Gerona lies between the ridges Caballos and Casas, on the Casas river, about two miles from the sea. The soil is mainly Mal Pais Gravel clay on the gentle undulations and knolls, with more or less of the light-colored sandy loam in depressions and on the lower levels, this latter type passing into the alluvial soil of the coastal fringe, which along the river comes up nearly to the town.

In the whole island no ferns were found on the Mal Pais Gravel type of soil. One fern, *Pteridium caudatum* (L) Maxon, occurs on the light-colored sandy loam about a mile east of Nueva Gerona, where it forms low bracken thickets, of small extent but very similar to those formed by its more cosmopolitan congener in our own northern

States. The best fern collecting in the Nueva Gerona district, as indeed for the island in general, was along the steep clayey or rocky banks of the arroyos. These had at that time but little water, only here and there pools, but the narrow and steep-banked channels were usually shaded by thickets of the coco plum and other shrubs or trees and were moist enough to favor the growth of many ferns. Growing out of the side of the perpendicular banks of a shallow arroyo, about a mile east of Nueva Gerona, were discovered two communities of the tree fern, *Cyathea arborea* (L.) Sm., with ascending trunks six or seven feet tall. In other similar arroyos, often where shaded by the coco plum, were *Adiantum cristatum* L., *A. fragile* Sw., and *Blechnum serrulatum* Rich.

At the outskirts of a jungle around a fresh-water pond near the base of Caballos ridge, there was found climbing in masses upon other vegetation, waist high, *Lycopodium cernuum* L., and near by, growing in much the same manner, the apparently delicate but in reality tough and wiry and decidedly thorny *Odontosoria fumarioides* (Sw.) J. Sm. About a mile north of Nueva Gerona, on the outskirts of the forest of the mangrove formation and where the soil consists mainly of humus, being probably at times brackish, were great tussocks of *Acrostichum aureum* L., with spreading fronds often as high as a man's head—magnificent specimens, the like of which we never see in the conservatories of the North. In the tussocks with this fern, but apparently not forming tussocks of its own, were fine specimens of *Nephrolepis biserrata* (Sw.) Schott. In a clearing at the edge of this same swamp forest was found *Tectaria martinicensis* (Spr.) Maxon. In a swamp forest with the royal palm, maumee apple, coco plum, etc., along a stream a few miles east of Nueva Gerona, there was found *Meniscium reticulatum* (L.) Sw., forming large hummocks similar to those of *Acrostichum aureum* L., and with the heavily fruiting leaves spreading

in all directions. In a forest on swampy soil, near the base of Mount Columbo, was found *Dryopteris patens* (Sw.) Ktze., while on the ground and at the base of trees near the coast east of Vivijagua, *Campyloneurum phyllitidis* (L.) Presl was collected in the mangrove formation.

Upon climbing the Sierra de los Caballos there was found on trees at the top of the ridge, at an elevation of about one thousand feet, the widely distributed *Polypodium polypodioides* (L.) Hitchc. This fern is claimed to have been at one time quite abundant on the northern mountains of the island, but it has been assiduously collected by the so-called "natives" for medicinal purposes and has apparently been all but exterminated there. In rather moist humus soil in the forest at the base of the mountain, among the rocks of the ancient sea cliff, *Adiantum villosum* L. was found, with the rachis quite conspicuously brown-villous.

In the western part of the island, in the vicinity of Los Indios, a mangrove forest fringes the river, and back of the town grades into a fresh-water jungle in which occur most of the species found in similar habitats in the northern part of the island near Nueva Gerona. *Meniscium reticulatum* was here quite common. The upper course of the Rio de los Indios, as well as also many of the tributary arroyos, have sharply cut banks along which the mica schist rocks are often exposed under the mantle of gravel clay. Along these banks occurred *Blechnum occidentale* L.; a climbing *Lygodium*, near *L. cubense* H. B. K.; *Dryopteris deltoidea* (Sw.) Ktze.; and a small *Trichomanes*, near *T. pyxidiferum* L. *Dicranopteris flexuosa* (Schrad.) Und. [*Gleichenia flexuosa* (Schrad.) Mett.] was found along a small arroyo near the base of the Sierra de la Cañada.

Along the lower course of the Majagua, north of Los Indios, there are considerable deposits of sand along the banks and in the bed of the stream, and along the banks

were found *Lygodium cubense* H. B. K., clambering over low shrubbery or twisting itself into dense mats; a *Lindsaya*, rather near *L. portoricensis* Desv., but small; and more of the same *Trichomanes* found in the upper Los Indios drainage.

One day was spent on the coral-limestone peninsula which forms the southwestern extension of the island. Practically the whole trip was along a trail through a tropical jungle where perhaps half of the vegetat on consists of species not seen in the northern portion of the island, but no ferns were seen there.

The last two days of field work were spent in the east central portion of the island, where the soil and vegetation are quite similar to those of the Nueva Gerona district. On the palm trunks along the banks of the upper Rio de Santa Fé, south of the town of Santa Fé, *Phlebodium aureum* (L.) J. Sm. was quite common. Near the magnesia springs at Santa Fé the steep banks of the short ravines leading to the river have been cleared of most of the shrubbery, but the larger trees have been left standing, and along the springy shaded banks of these ravines ferns were abundant. Within the space of probably not over two hundred feet square were collected *Dryopteris sancta* (L.) Ktze., *Tectaria trifoliata* (L.) Cav. [*Aspidium trifoliatum* (L.) Sw.], *Adiantum cristatum* L., *Dryopteris patens* (Sw.) Ktze., and *Ceropteris tartarea* (Cav.) Link.

So far as known to the present writer, only three other collections that have included ferns have been made on the Isle of Pines. Seven species were collected by Dr. J. F. Shafer, the orchid enthusiast of Pittsburg, during March 1910, mainly around springs to the west of Santa Fé; thirteen species by Mr. A. H. Curtiss, in the Nueva Gerona district during the winter of 1903–04, and distributed in his sets of West Indian plants; and one species by Dr. C. F. Millspaugh, February 1899, from Pedernales Point, at the southeastern extremity of the island.

To make our lists more complete, there follows an enumeration of the species collected by these botanists.

By Dr. J. F. Shafer:

Adiantum melanoleucum Willd.
Blechnum occidentale L.
Cyathea arborea (L.) Sm.
Dryopteris deltoidea (Sw.) Ktze.
Goniopteris obliterata (Sw.) Und.
Odontosoria fumarioides (Sw.) J. Sm.
Lycopodium cernuum L.

By Mr. A. H. Curtiss:

Adiantum fragile Sw.
Adiantum melanoleucum Willd.
Adiantum villosum L.
Alsophila Wrightii Und.
Blechnum occidentale L.
Dicranopteris flexuosa (Schrad.) Und.
Goniopteris obliterata (Sw.) Und.
Lygodium polymorphum (Cav.) H. B. K.
Nephrolepis biserrata (Sw.) Schott
Neuromanes pinnatus (Hedw.) Und.
Odontosoria fumarioides (Sw.) J. Sm.
Lycopodium cernuum L.
Marsilea caribæa Und.

By Dr. C. F. Millspaugh:

Asplenium dentatum L.

For the identification of most of his Isle of Pines collections the writer is indebted to the New York Botanical Garden. A complete series of specimens is deposited in the herbarium of the Carnegie Museum and a duplicate series is in the New York Botanical Garden. A set of the remaining duplicate ferns (and fern allies) will be placed in the herbarium of the American Fern Society.

CARNEGIE MUSEUM, PITTSBURG, PA.

An interesting find

HAROLD W. PRETZ

It has been said that it is the unexpected that happens, and in so far as we are unprepared for some events, this is true. Everyone who has tramped about out of doors will recall certain experiences the very charm of whose occurrence was to a large degree due to their unexpectedness. Impromptu excursions frequently hold such experiences and usually create an expectancy that is sometimes realized.

The second Sunday in January was one of those rare winter days when the call of the open was most insistent. E. S. and W. Mattern, the writer's field companions, had the evening before predicted ideal weather conditions and declared their intention of going somewhere "up the road" in the morning. Anything in the vicinity of the Lehigh Valley northward from Allentown to White Haven fifty miles distant, and even beyond, is vaguely characterized as "up the road."

The writer had decided to stay at home, but circumstances brought us together at 10:15 in the morning, with the matter still open. With almost instant decision, we chose a trip which, though previously considered, held little in prospect but the pleasure of a day's outing. Thanks to training from long practise in the matter of preparation for field trips, by 10:30 we were on a train bound for Glen Onoko, the first place in our itinerary for the day, ready for anything that might turn up.

For those with an eye to the beautiful in nature, the Glen must always make an appeal; and on this day, in its winter dress, it was beautiful indeed. We used the camera freely.

The next point visited was one of the series of clifflike outcrops which occur frequently along the Lehigh river

in the "Gorge" from Glen Onoko to White Haven. To one of these, a mile or more up the river and high up the hill, we made our way. Mountain spleenwort (*Asplenium montanum* Willd.) grows in the vicinity of the glen as well as at several places in the vicinity of Lehigh Gap, so that it was not unreasonable to predict its occurrence on these cliffs. It was there, as we expected; but climbing down to a shelf of rock, Walter Mattern, who was leading, gave a little exclamation which the writer looking over his shoulder, all but echoed, for there, flattened up against a side of the cliff facing north, was a fern new to us. It could be none other but Bradley's spleenwort, and so it proved to be. The writer found another plant near by. The fact of its occurrence having been established, only a superficial examination of the cliff was made, but mountain spleenwort was found abundant, as expected. That this species occurs on some of the other outcrops is not unlikely, and the writer hopes later to confirm this prediction.

For the sake of record, the station for *Asplenium Bradleyi* D. C. Eaton[1] is here given as "On outcrops of Pocono sandstone on Broad mountain along the Lehigh river north of Glen Onoko, Carbon county, Pa., altitude approximately 1,500 feet, January 8, 1911, *W. Mattern* and *H. W. Pretz* (*3155*)."

So far as the writer knows, this species has been collected at one other station in Pennsylvania, along the Susquehanna, in the vicinity of Lancaster county (*Small*),[7] at an elevation of about 260 feet. From this locality there is much excellent material in the herbarium of the Philadelphia Botanical Club, at the Academy of Natural Sciences in Philadelphia, well illustrating the variability of the species. In the vicinity of this station the species has been collected at a number of places.

There are two records of the species having been collected in the state of New York, farther north. In re-

sponse to an inquiry, Dr. C. H. Peck, State Botanist, has informed the writer that he was given the approximate location of the first of these, "Near Newburg in 1864," by Prof. D. C. Eaton, but that he failed to find plants

ASPLENIUM BRADLEYI D. C. Eaton

when he visited the locality some years later. Dr. Peck believes the second station,[6] represented by specimens collected by Mr. C. Lown, of Poughkeepsie, which are simply recorded "Shawangunk mountains," to be probably thirty or forty miles northwest of Professor Eaton's, and both stations to be probably 600 to 900

feet above sealevel, though the Shawangunk range rises to an altitude of approximately 2,100 feet.

The species has been collected in Maryland,[2] and to the south it ranges as far as Georgia and westward as far as Arkansas and Missouri. Dr. Small[9] gives its range from "New York to Illinois and Missouri; south to middle Georgia, Alabama, and Arkansas." In Georgia there is a record for Stone mountain, 1,000 feet, *Small*,[7, 8] and Roland M. Harper,[5] in his fern flora of the state, mentions that there are "various stations," all in the mountains. Dr. Chas. Mohr,[3] in his Plant Life of Alabama, also refers the species to the mountain region, and records one station at an altitude of 1,600 feet and another at 2,200 feet. The article by Dr. E. L. Lee,[4] of Bridgeport, Ala., in the Fern Bulletin for April 1909, on the occurrence of the species in the Cumberland mountains of that state and Tennessee, whence the original specimens came, is of especial interest, particularly his notes on habitat.

If we may judge from these and other records, Bradley's spleenwort, in its distribution along the Appalachians from New York southward, appears to keep close to the mountains, often in the South at high altitudes. Its occurrence at an elevation of 1,500 feet as far north as Pennsylvania is perhaps less surprising than unexpected.

The writer has no information, altitudinal or otherwise, regarding the stations in Arkansas, Missouri, or Illinois, west of the Appalachian system, or in some states that include a part of this system within their borders. It would interest the writer to know more of this species, so far as distribution, altitude, and preference of habitat are concerned. Investigation would naturally yield much valuable information. Perhaps if the members of the Society were consulted, it might be found that the writer is not alone in his interest. In this present day the mere mapping of the ranges of some species by certain bounding stations is far from satisfying.

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3. **Mohr, C.** Plant life of Alabama 78. 1901.

4. **Lee, E. L.** *Asplenium Bradleyi* in north Alabama. Fern Bulletin **17**: 43–45. 1909.

5. **Harper, R. M.** The fern flora of Georgia. Fern Bulletin **13**: 1–5. 1905.

6. **Gilbert, B. D.** The fern flora of New York. Fern Bulletin **11**: 97–105. 1903.

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ALLENTOWN, PA.

Lycopodium flabelliforme

E. J. WINSLOW

In an article in the July number of Rhodora [1911], Mr. W. H. Blanchard raises *Lycopodium complanatum* var. *flabelliforme* to specific rank. Mr. Blanchard's observations are definite and comprehensive, and a careful reading of his paper will open the eyes of the observer to many interesting details of the structure and manner of growth of this group of fern allies. I quote:

"The two plants *L. complanatum* and *L. tristachyum* have several distinctive characters in common—they have underground rootstocks, ripen their fruit early in the season, have slender peduncles growing from nearly similar points, and enlarge by growth from the ends of all branches, while *L. flabelliforme* has different or just the opposite characters." * * * * *

"In *L. complanatum* the leaves being very minute the axis is practically naked and, marking the end of the season's growth, there is plainly shown a sharp constriction resembling the separation of the thorax and abdomen of a wasp, and each year's growth resembles an elongated sausage.

"The growth of *L. flabelliforme* is entirely upward, that is it does not increase laterally. Its growth consists of an annual elongation of the stem of about 1½ inches (3 to 5 cm.) which, a short distance (½ to 1 cm.) below the top of the terminal bud, sends out two branches which fork and re-fork from five to seven times and result in giving a striking resemblance to a funnel or tunnel with its sides rising at an angle of 30° from a perpendicular, the slant height of the inverted cone being 1¼ to 2 inches (3 to 5 cm.). A branch or a part of a branch when flattened has the appearance of a fan, the fact being that it is funnel-form in the field and flabelliforme in the herbarium. Growth from the ends of these branchlets rarely takes place indicating that they are commonly either destitute of buds or that the buds are dormant and the plant grows (except in rare instances) only by a succession of funnel-bearing increases of stems, the funnels completed (except rarely) the first season."

Since reading this paper I have taken some pains to compare these two plants in the field at several stations in northern Vermont, and there seems to be sufficient reason for regarding them as specifically distinct. On two points my observations do not entirely agree with those of this author. I have usually found *L. complanatum* with a rootstock close to the surface of the ground, differing in this respect very little from *L. flabelliforme*. In *L. flabelliforme* the starting of a second season's growth from the tip of a branch is not, in my experience, a rare occurrence. In some stations, usually in shaded situations, it is very frequent, and even a third year's growth

may be found on an occasional branch. But it is certainly true that this method of growth is exceptional and not the regular thing, as it is in *L. complanatum*.

The differences in the number, form, and attitude of the branches, in the number of strobiles, and the season of maturity, are sufficient to characterize the separate species, but a written comparison gives but a faint notion of the striking difference in the appearance of the two plants as they grow together. At Willoughby Lake, Vt., where both species grow in abundance, with *L. tristachyum* near by, I found several intermediate forms, also considerable variation from the type in both species. With sufficient study, the group may prove as prolific in matter for discussion as the ternate botrychia.

The recent discovery of *L. complanatum* in Hartland, Vt., by Mr. H. G. Rugg, indicates that this species may be looked for considerably south of its supposed northerly range.

LASELL SEMINARY,
AUBURNDALE, MASS.

Edward Palmer

WILLIAM EDWIN SAFFORD

Than longen folk to gon on pilgrimages,
And *palmers* for to seken straunge strondes.
Chaucer, Gen. Prol. to Canterbury Tales.

Dr. Edward Palmer, whose name is known to botanists of all nations, died at his home in Washington, D. C., a few minutes past midnight of Palm Sunday, April 9, 1911, after an illness of a few days. His whole life had been devoted to science, which he served, not as an investigator in any special line, but as an explorer and collector of unrivaled merit. In the field of botany alone he is distinguished as the discoverer of 1,173 new species, includ-

ing flowering plants and ferns, with many more of his later collecting still remaining to be described.

He was the son of a professional florist and horticulturist, of Hockwold cum Wilton, in the county of Norfolk, England, where he was born January 12, 1831. Coming to this country at the age of eighteen, he settled at Cleveland, Ohio, where he formed the acquaintance of Dr. Jared Kirtland, one of the most eminent scientists of his day, and one of the earliest members of the American Academy of Science. From him he learned the art of collecting and preserving objects of natural history, thus laying the foundation of his future career, and through Kirtland's influence he was, in 1853, appointed naturalist of the *Water Witch*, on her celebrated expedition to Paraguay, which led to our war with that country. From that time until within a short time of his death, he was an ardent and untiring collector, going on one expedition after another, and returning with material of botanical, zoölogical, and ethnological interest, which has been distributed among the museums of this country and Europe.

A sketch of his life, read before the Botanical Society of Washington, January 10, 1911, on the occasion of the 80th anniversary of his birth, was published in Popular Science Monthly **77:** 341-354. 1911, and distributed by the Society in separate form. It contains an account of most of his early expeditions, and of his services during the civil war and after its close, as an acting assistant surgeon in the United States Army.

He was congratulated on the success of his work by such eminent botanists as Professor Asa Gray, Dr. J. Torrey, and Dr. G. Engelmann, who expressed their appreciation of it in their published works. Professor Gray dedicated to him the genus *Palmerella*, stating that he did so in acknowledgment of Dr. Palmer's "indefatigable and fruitful explorations of the botany of the southwest-

ern frontiers, from Arizona to the islands of Lower California, in which region he has accomplished more than all his predecessors." Among the botanists whose friendship Dr. Palmer greatly valued, and of whom he always spoke with gratitude, were Dr. George Vasey, Sereno Watson, Mr. and Mrs. T. S. Brandegee, and Dr. C. C. Parry, whom he accompanied on his first mission to Mexico, in 1878.

From that date until the end of his life he made frequent visits to Mexico, often visiting unexplored fields opened up by railroads, from which he secured great numbers of species new to science. In 1880 he made extensive collections in the states of San Luis Potosi, Coahuila, and Nuevo Leon. Preliminary lists of the ferns he collected while associated with Dr. Parry and when alone were made out by Professor Daniel Cady Eaton, and published, together with a list of the flowering plants by Sereno Watson, in volume 18 of the Proceedings of the American Academy.

In 1885 he collected in the mountains of southwestern Chihuahua; in 1886, in the state of Jalisco, principally near Guadalajara, the capital; and in 1887, near Guaymas, Sonora, and across the Gulf of California, on the shore of Lower California. Lists of the plants collected on these expeditions were published in the Proceedings of the American Academy, volumes 21, 22, and 24.

He afterwards visited the Mexican states of Colima, Sinaloa, and Guerrero, and the territory of Tepic. His later collections have never been worked up as units; but publications of new species of his collecting are continually appearing. He revisited the states of San Luis Potosi, Coahuila, and Chihuahua, and he made two excursions to the mountains of Durango, and to the more tropical country of Tamaulipas.

Among the new species of ferns based upon types of his collecting are the following:

ASPLENIUM MODESTUM Maxon, Bull. Torrey Club **31:** 657. 1904. TYPE: *Palmer 162*, collected in 1885, at the Hacienda San Miguel, near Batopilas, in the mountains of southwestern Chihuahua, Mexico.

CHEILANTHES AEMULA Maxon, Contr. U. S. Nat. Herb. **10:** 495. 1908. TYPE: U. S. National Herbarium no. 572224 (*Palmer 187*), collected in 1907 in a river canyon near Victoria, Tamaulipas, Mexico.

CHEILANTHES MEIFOLIA D. C. Eaton, Proc. Am. Acad. **18:** 185. 1883. TYPE: *Palmer 1377*, collected in 1880 near Guajuco, state of Nuevo Leon, Mexico.

CHEILANTHES MONCLOVIENSIS Baker, Annals Bot. **5:** 210. 1891. TYPE: *Palmer 1378*, collected in 1880 at Soledad in the state of Coahuila, Mexico.

CHEILANTHES PALMERI Eaton, Proc. Am. Acad. **22:** 464. 1887. TYPE: *Palmer* 223, collected in 1886 on a shady bank in a deep canyon near Guadalajara, state of Jal sco, Mexico.

GYMNOPTERIS SUBCORDATA (Eat. & Dav.) Und. Bull. Torrey Club **29:** 628. 1902. *Gymnogramme subcordata* Eat. & Dav. Contr. U. S. Nat. Herb. **5:** 138. *pl. 76.* 1897. TYPE: *Palmer 1416*, collected in 1891 at Imala, state of Sinaloa, Mexico.

NOTHOLAENA AURANTIACA D. C. Eaton, Proc. Am. Acad. **22:** 462. 1887. TYPE: *Palmer* 83, collected in 1886 near the Barranca of Guadalajara, state of Jalisco Mexico.

NOTHOLAENA PALMERI Hook. Ic. Pl. *pl. 1678.* 1887. TYPE: *Parry & Palmer 991*, collected in 1878 in the mountains near the city of San Luis Potosi.

NOTHOLAENA LEONINA Maxon (MS.). TYPE: *Palmer 1381*, collected in February 1880 near Monterey, state of Nuevo Leon, Mexico.

PELLAEA NOTABILIS Maxon, Contr. U. S. Nat. Herb. **10:** 500. 1908. TYPE: U. S. National Herbarium no. 572223, (*Palmer 234*), collected in 1907 near Victoria, state of Tamaulipas, Mexico.

POLYPODIUM MAXONII C. Chr. Ind. Fil. 543. 1906. *Polypodium firmulum* Maxon, Contr. U. S. Nat. Herb. **7:** 274. *pl. 61. f.* 3. 1903; not Baker, 1893. TYPE: U. S. National Herbarium no. 397906 (*Palmer 448*), collected in 1902 in the mountains of Alvarez, state of San Luis Potosi, alt. 8,000 feet, from the shaded under sides of large oaks.

POLYSTICHUM SOLITARIUM (Maxon) Und. Contr. U. S. Nat. Herb. **10:** 493. 1908. *Polystichum munitum solitarium* Maxon, Fern Bull. **11:** 39. 1903. TYPE: *Palmer 102*, collected in 1875 on the northern end of Guadalupe Island, off the Pacific coast of Lower California.

Like the palmers of old, who returned from one pilgrimage only to start out afresh, he continued his chosen work until the very end. His last pilgrimage was in 1910, to the vicinity of Tampico, on the Gulf of Mexico.

To the meeting of the Botanical Society of Washington already mentioned, he was escorted in a carriage by members appointed for the purpose. He was placed in the seat of honor, and addresses were made by members telling of his life's work. Letters were also read from various eminent men of science not residing in Washington, all of them testifying to the valuable services he had rendered. At the close of the exercises he was presented w th an appropriate birthday gift by the members of the soc ety. The venerab'e traveler received the congratulations of those present with tears streaming down his cheeks, doubtless realizing that this was his valedictory. It proved indeed to be a final farewell. He left his room only once or twice afterward, and in just three months after attending his birthday celebration he breathed his last.

WASHINGTON, D. C.

Grace A. Woolson

EMILY HITCHCOCK TERRY

A woman of marked ability, and perhaps of equally marked peculiarities, was Miss Grace A. Woolson, of Pittsford, Vermont, whose death occurred during this past summer. She was an ardent lover of nature, of botany especially, though she took great delight in all plant and animal life. We never saw her at the meetings of the Vermont Botanical Club, of which she was a member, but she did not forget or ignore them, always demanding the fullest particulars of the proceedings from those who had been present. Her greatest work was in the culture of ferns, to which she devoted much time and energy. Her garden also, where one found the choicest vegetables and very beautiful flowers, gave abundant evidence of care and wise forethought.

She contributed many articles to Country Life, as well as to many scientific periodicals and to newspapers. Her best work was put into her little book entitled Ferns and How to Grow Them. This gives very complete instruction in regard to their care and cultivation and is beautifully illustrated by photographs taken by her fellow townsman, Dr. Swift, who in the midst of a very arduous medica practice was always ready to "take pictures" for her. Her fern garden was most interesting and beautiful, containing all species found in the vicinity, as well as many others sent her from other localities. Her house was profusely decorated with these dainty plants which she always had growing in all manner of receptacles, from ordinary flower pots to dainty glass dishes. Here one saw the very rare *Asplenium ebenoides*, which she found in two or three places near her home, and rarest of all, the hybrid between the *Asplenium Trichomanes* and *A. Ruta-muraria*, never found in this coun-

try by any one else and, in Switzerland, by only one German botanist. The finding of this hybrid was assuredly her greatest botanical achievement. I remember well her de ight when she discovered growing by her doorstep the rare hybrid *Aspidium pittsfordense,* which had been produced naturally. It certainly seemed as if things of botanica interest gravitated toward her.

To those who knew Miss Woolson, no estimate of her life would be complete without a mention of her pet tree-toads, which she kept for many years and which she had tra ned to perform several little feats; and of her cats, which were to her almost human personalities and which responded to her devotion in a manner that made them appear to belong to a superior race of felines.

Miss Woolson was born in Pittsford, Vt., on the 17th of October 1856. She was graduated at the High School in Springfield, Vt., and at Kimball Union Academy, at Meriden, N. H. She taught for several years in the vicinity of Pittsford, but failing health compelled her to abandon that profession. Her love of nature induced her to enter upon the more scientific work, to which she devoted herself until the time of her death, June 23, 1911.

NORTHAMPTON, MASS.

Notes and news

In connection with a study of the local distribution of some of the common North American Ferns, Prof. E. J. Winslow, Auburndale, Mass., would appreciate any information sent him on the distribution of the ebony spleenwort, including definite descriptions of the localities personally observed by the sender. Of special interest will be reports on any considerable areas within its range where this fern has not been found, and reports from the frontiers of its range (Maine, northern New Hampshire

and Vermont, Ontario, the western Mississippi valley, Texas, Arkansas, southern Alabama, and Florida).

Prof. L. S. Hopkins, 3732 Boquet street, Pittsburg, Pa., announces that he has for distribution to members for postage: 10 sheets of each of *Lycopodium porophilum* and *Cystopteris fragilis magnasora*, and 20 sheets of *Equisetum hiemale intermedium*.

In connection with the meeting of the American Association for the Advancement of Science, during the last week in December, at Washington, D. C., the American Fern Society will hold a meeting on Friday, December 29, in the Business High School Building, 9th street and Rhode Island avenue, N. W. The attractions of the city and of the meetings of various botanical societies during the week should offer an additional inducement to members to attend this meeting.

According to the report of the Judge of Elections, Miss Harriet Mulford, Hempstead, N. Y., the recent annual election of the American Fern Society resulted in the re-election of the former officers, except the president, who had declined renomination. The officers elected are:

President—Robert A. Ware, Boston, Mass.
Vice-President—Nellie Mirick, Oneida, N. Y.
Secretary—Lewis S. Hopkins, Pittsburg, Pa.
Treasurer—Harold G. Rugg, Hanover, N. H.

Additions to the list of members and subscribers:

Amidon, Dr. R. W., Chaumont, Jefferson Co., N. Y.
Bartsch, Dr. Paul, Smithsonian Institution, Washington, D. C.
Browning, Mrs. Arthur, Rowe, Mass.
Dulau & Company, London, England.
Kilby, Mrs. H. S., No. Attleboro, Mass.
Library U. S. National Museum, Washington, D. C.
Nordgren, Mrs. A. J., Galva, Ill.
Notre Dame University, Notre Dame, Ind.
Safford, Wm. E., 3339 Mt. Pleasant St., Washington, D. C.
Worcester Natural History Society, Worcester, Mass.

INDEX TO VOLUME I

Acrostichum, 105; aureum, 122, 133; excelsum, 46
Additions to the herbarium, 85
Adiantum, 106; bellum, 119; capillus-veneris, 39, 45, 75, 82; caudatum, 45; cristatum, 75, 133, 135; cubense, 75; emarginatum, 39; fragile, 75, 133, 136; Jordani, 18; lucidum, 126; macrophyllum, 75; melanoleucum, 75, 136; pedatum, 18, 62, 102, 104; petiolatum, 75; pulverulentum, 75; tenerum, 75; trapeziforme, 75; villosum, 75, 134, 136
Alsophila Wrightii, 136
American Fern Society, 1, 2, 16, 28, 31, 32, 63, 64, 90-92, 115, 118-120, 150; officers 1911, 32; 1912, 150; official organ, 1
Ananthacorus, 71
Anemia, 41, 42, 76, 110; adiantifolia, 42, 47, 76; aurita, 41, 42; coriacea, 41, 42; mexicana, 42; **nipeënsis,** 41-43; portoricensis, 42; speciosa, 42; Underwoodiana, 75, 76
Aneimites fertilis, 109
Anetium, 71
Antrophyum from Luzon, A new, 71
Antrophyum nanum, 72, 74; parvulum, 74; **Williamsi,** 72-74
Arctic regions, The Pteridophyta of the, 65
Aspidium agatolepis, 95; argutum, 39; athyrioides, 95; fragrans, 114; marginale, 39; molle, 45, 77; paleaceum, 94; parallelogrammum, 94; pittsfordense, 149; trifoliatum, 135
Asplenium, 106; acrostichoides, 79-81; acrostichoides serratum, 80, 81; acrostichoides thelypteroides, 80, 81; adiantum-nigrum, 45; angustifolium, 118; Bradleyi, 49, 50, 138, 139; cuneatum, 76; dentatum, 76, 136; ebenoides, 85, 115, 148; falcinellum, 125; formosum, 76, 126; modestum, 146; montanum, 102, 115, 138; monteverdense, 76; myriophyllum, 76; nidus, 126; pinnatifidum, 49, 50, 102, 115; platyneuron, 62, 102; ruta-muraria, 148; serratum, 76, 80, 81, 126; thelypteroides, 80, 81; trichomanes, 62, 102, 148; viride, 67, 69, 114
Asplenium acrostichoides Sw., 79
Athyrium acrostichoides, 55, 102; alpestre, 36, 67, 69; angustifolium, 12, 61, 102; filix-femina, 62, 102, 116
Azolla filiculoides, 82
Benedict, R. C. Fern leaves, ferns and fern allies, 9; Dryopteris filix-mas × marginalis produced in cultivation, 24; A new Cuban fern, 40; Ferns of the Transvaal [review], 44; A new Antrophyum from Luzon, 71; The ferns of Mt. Apo (review), 83; Botrychium Jenmani in Cuba, 98
Blechnum occidentale, 77, 126, 134, 136; serrulatum, 46, 47, 77, 133; volubile, 126
Boott's fern, 13
Botrychia, Notes on the, 3
Botrychium, 42, 67, 98; alabamense, 98; biternatum, 98; boreale, 69; californicum, 98; dissectum, 3, 4, 6; Jenmani, 98; lanceolatum, 3, 4, 12, 69, 115, 116; lunaria, 69; matricariæfolium, 3; neglectum, 12; obliquum, 3, 4, 6, 99, 102; obliquum oneidense, 4; obliquum tenuifolium, 4; ramosum, 3-6; silaifolium, 98; silaifolium intermedium, 98; simplex, 69, 115; ternatum, 99; Underwoodianum, 98; virginianum, 3, 4, 102
Botrychium Jenmani in Cuba, 98
Brainerd, E. New stations for Dryopteris Goldiana × marginalis in Vermont, 78
Britton, E. G., 51; Fern collecting in Cuba, 75
California, Fern collecting in Southern, 17
California fern notes, Southern, 104

California ferns, Notes on Southern, 37
California ferns, Some Southern, 82
Camptosorus rhizophyllus, 62, 103
Campyloneurum, 126; angustifolium, 77; costatum, 77; phyllitidis, 47, 76, 134
Ceropteris calomelanos, 76, 126; tartarea, 135
Cheilanthes aemula, 146; californica, 38, 82; Fendleri, 19; gracillima, 18; meifolia, 146; moncloviensis, 146; Palmeri, 146; Parishii, 85
CHRISTENSEN, C. On the genus Dryopteris, 33; The Pteridophyta of the Arctic regions, 65; The tropical American species of Dryopteris subgenus Eudryopteris, 93; [Dryopteris thelypteris in Mexico?] note, 118
Cinnamon fern, A new variety of the, 100
CLEVELAND, G. F. Ferns of the Isthmus of Panama, 111
Clinton fern, 13, 14 (see Dryopteris Clintoniana)
Collecting in Southern California, Fern, 17
Collecting trip in Southern Florida, A, 51
Collector in Florida, A fern, 45
Ctenitis, 36
Cuba, Botrychium Jenmani in, 98
Cuba, Fern collecting in, 75
Cuban fern, A new, 40
Cyathea arborea, 133, 136
Cycads, 11
Cystopteris bulbifera, 103, 116; fragilis, 67, 68, 82, 103, 104; fragilis magnasora, 150; montana, 66, 68,
Dennstædtia, 106, 110; punctilobula, 103
Dicranopteris flexuosa, 134, 136
Dictyoxyphium panamense, 126
Diplazium grandifolium, 126
Doryopteris palmata, 76
DOWELL, PH. Notes on some ferns found during 1909, 12; On the study of ferns, 53; Notes on ferns attacked by a leaf roller, 58
DRUERY, C. T. Polypodium vulgare in Great Britain, 19
Dryopterideæ, 34-37
Dryopteris, 33-37, 55, 59, 77, 78, 93-97, 106, 118; ampla, 36; aquilonaris, 36, 69; arguta, 36; athyrioides, 95; **cinnamomea,** 95; Clintoniana, 36, 61; Clintoniana × marginalis, 23; Clintoniana × spinulosa, 14; cristata, 13, 36, 55, 62, 103; cristata × marginalis, 12, 59, 116; cristata × spinulosa, 13, 14; decussata, 37; deltoidea, 37, 134, 136; dilatata, 12, 67; dryopteris, 36; filix-mas, 22-24, 36, 67, 69, 93-95; **filix-mas × marginalis,** 22-24, 85; floridana, 36; Fournieri, 95, 96; fragrans, 36, 67-69; glandulifera, 95; Goldiana, 12, 14, 36, 61, 78, 79, 103, 115, 118; Goldiana × marginalis, 14, 78; gongylodes, 36; hexagonoptera, 36, 103; indecora, 95; intermedia, 12-14, 103; Karwinskyana, 97; Linnæana, 36, 67, 69; marginalis, 22, 24, 36, 61, 78, 79, 103; **Maxoni,** 96, 97; mexicana, 36; mollis, 35, 36; nevadensis, 36; normalis, 36; noveboracensis, 36, 54, 103; oligophylla, 77; opposita, 36; oregana, 36; oreopteris, 36; **paleacea,** 93, 94; parasitica, 35, 36, 77; patens, 35, 36, 46, 77, 134, 135; patula, 36, 93-97; phegopteris, 35, 36, 67, 69, 103; reptans, 36; reticulata, 36; rigida arguta, 82, 97; Robertiana, 36; **Saffordii,** 93, 94; sancta, 135; simulata, 36, 59; spinulosa, 13, 14, 36, 59, 61; spinulosa dilatata, 69; stipularis, 36; tetragona, 35, 36; thelypteris, 36, 54, 103, 118; tremula, 118; unita, 36, 46
Dryopteris filix-mas × marginalis produced in cultivation, 24
Dryopteris Goldiana × marginalis in Vermont, New stations for, 78
Dryopteris, On the genus, 33
Dryopteris subgenus Eudryopteris, The tropical American species of, 93
EDWARDS, S. C. Notes on the gray polypody, 83
Elaphoglossum Herminieri, 126
Equisetum, 11, 16, 40, 44, 65, 68; arvense, 16, 40, 67, 69, 103; arvense arctica, 70; arvense boreale, 70; hiemale intermedium, 150; hyemale, 16, 69, 103; palustre, 70; ramosissimum, 44; scirpoides,

64, 67, 69; silvaticum, 69; telmateia, 40; variegatum, 67, 69
Eudryopteris, 36, 93
Eudryopteris, The tropical American species of Dryopteris subgenus, 93
Exchange list, Herbarium, 28
Extracts from letters from H. E. Ransier, 16
Fern allies, Fern leaves, ferns and, 9
Fern, A new Cuban, 40
Fern, A new hybrid, 22
Fern, A new variety of the cinnamon, 100
Fern collecting in Cuba, 75
Fern collecting in Southern California, 17
Fern collector in Florida, A, 45
Fern leaves, ferns and fern allies, 9
Fern notes from the South, 49
Fern notes, Southern California, 104
Ferns at home, and visiting, 60
Ferns attacked by a leaf roller, Notes on, 58
Ferns found during 1909, Notes on some, 12
Ferns found in the vicinity of Ohio Pyle, Pa., A list of the, 101
Ferns of Mt. Apo, The (a review), 83
Ferns of the Isle of Pines, West Indies, Notes on the, 129
Ferns of the Isthmus of Panama, 111
Ferns of the Transvaal [a review], 44
Ferns, Notes on Southern California, 37
Ferns, On the study of, 53
Ferns, Some Southern California, 82
Ferns, The study of fossil, 105
Field meeting at Hartford, The, 115
Filicales, 44
Filix bulbifera, 62; fragilis, 12
Florida, A collecting trip in southern, 51
Florida, A fern collector in, 45
FLOYD, F. G. Polypodium vulgare L. var. auritum Willd., 25
Foreword, 1
Fossil ferns, The study of, 105
Glaphyropteris, 37
Gleichenia, 106, 110; flexuosa, 134
Gleicheniaceæ, 10
Goniopteris, 34, 36, 37; obliterata, 136; reptans, 36; tetragona, 36
Gray polypody, Notes on the, 83
Great Britain, Polypodium vulgare in, 19
Gymnogramma triangularis, 38
Gymnogramme calomelanos, 76; subcordata, 146
Gymnopteris subcordata, 146; triangularis, 18, 66, 82
Gymnospermæ, 11
Hans, A., 24
Hartford, The field meeting at, 115
Harts-tongue fern, 16
Hecistopteris, 71
Hemitelia petiolata, 126
Herbarium, Additions to the, 85; exchange list, 28
HOPKINS, L. S., 49; Notes on the botrychia, 3; Herbarium exchange list, 28; Additions to the herbarium, 85; A new variety of the cinnamon fern, 100; A list of the ferns found in the vicinity of Ohio Pyle, Pa., 101
Hybrid fern, A new, 22
Hydropterides, 11
Interesting find, An, 137
Isle of Pines, West Indies, Notes on the ferns of the, 129
Isoetes echinospora, 70; lacustris, 70
Isthmus of Panama, Ferns of the, 111
Items for members, 28
JENNINGS, O. E. Notes on the ferns of the Isle of Pines, West Indies, 129
KINGMAN, C. C. Notes on Southern California ferns, 37
KNOWLTON, F. H. The study of fossil ferns, 105
Lastræa fragrans, 67; thelypteris, 21
Lastrea, 34, 35
Leaf roller, Notes on ferns attacked by a, 58
LEE, E. L. Fern notes from the South, 49
Leptogramma, 34
Lindsaya portoricensis, 135
List, Herbarium exchange, 28
List of the ferns found in the vicinity of Ohio Pyle, Pa., A, 101
Luzon, A new Antrophyum from, 71
Lycopodium, 11, 15, 44, 65, 68; alpinum, 70; annotinum, 15, 70; caronum, 70; carolinianum, 45; cernuum, 133, 136; clavatum, 15, 45, 70; complanatum, 70, 103, 116, 141-143; com-

planatum chamæcyparissus, 70; complanatum flabelliforme, 141; flabelliforme, 141, 142; inundatum, 15, 116; lucidulum, 103; obscurum, 15, 103, 116; obscurum dendroideum, 116; porophilum, 150; pungens, 70; selago, 67, 70; tristachyum, 103, 141, 143
Lycopodium inundatum in the White Mountains, 15
Lygodium, 10, 55, 106: cubense, 134, 135; digitatum, 129; palmatum, 117; polymorphum, 136; radiatum, 125, 129
Maine, Polypodium vulgare in, 7
Marattiales, 44
MARSHALL, M. A. Lycopodium inundatum in the White Mountains, 15
Marsilea caribæa, 136
Marsileales, 44
Marsiliaceæ, 11
Matteuccia struthiopteris, 12, 61
Maxon, W. R., 59
Meeting at Hartford, The field, 115
Meniscium, 34, 36; reticulatum, 36, 133, 134
MERRILL, H. W. Polypodium vulgare in Maine, 7
Monogramma, 71
Mt. Apo, The ferns of (a review), 83
MOXLEY, G. L. Some Southern California ferns, 82; Southern California fern notes, 104
Naturalist afloat, Notes of a, 121
Nephrodium, 34, 35: filix-mas, 45; mexicanum, 95, 96: thelypteris, 45
Nephrolepis, 125; biserrata, 123, 133, 136; exaltata, 46, 47
Neuromanes pinnatus, 136
New Antrophyum from Luzon, A, 71
New Cuban fern, A, 40
New hybrid fern, A, 22
New stations for Dryopteris Goldiana × marginalis in Vermont, 78
New variety of the cinnamon fern, A, 100
Nomina conservanda, 16
Notes and news, 32, 63, 89, 118, 149
Notes from the South, Fern, 49
Notes of a naturalist afloat—I, 121
Notes on ferns attacked by a leaf roller, 58
Notes on some ferns found during 1909, 12
Notes on Southern California ferns, 37
Notes on the botrychia, 3
Notes on the ferns of the Isle of Pines, West Indies, 129
Notes on the gray polypody, 83
Notes, Southern California fern, 104
Notholæna aurantiaca, 146; leonina, 146; Newberryi, 17; Palmeri, 146
Odontosoria fumarioides, 133, 136
Ohio Pyle, Pa., A list of the ferns found in the vicinity of, 101
Olfersia cervina, 77
Onoclea, 105, 106: sensibilis, 61, 103
On the genus Dryopteris, 33
On the study of ferns, 53
Onychium, 106
Ophioglossales, 11, 44
Ophioglossum palmatum, 52; reticulatum, 45; vulgatum, 45
Osmunda, 106, 116: cinnamomea, 61, 102; cinnamomea **auriculata,** 100; Claytoniana, 55, 61, 102, 116; regalis, 45, 61, 102, 116
Palmer, Edward [biographical sketch], 143
Palms, 123: Acrocomia sclerocarpa, 124; vinifera, 124; Attalea cohune, 123, 124; Bactris minor, 125; Chamædorea, 125; Desmoncus oxyacanthos, 125; Elaeis melanococca, 124; Geonoma, 125; Iriartea exorrhiza, 124; Oreodoxa regia, 124
Panama, Ferns of the Isthmus of, 111
Panama, Isthmus of, 122
Pellæa andromedifolia, 18, 38, 82; atropurpurea, 62: notabilis, 147; ornithopus, 17, 38, 82
PEMBER, F. T. Fern collecting in Southern California, 17; A fern collector in Florida, 45
Pessopteris crassifolia, 76
Phegopteris, 34-36: alpestris, 36; dryopteris, 12, 62; hexagonoptera, 36; Linnæana, 36· phegopteris, 12, 36; Robertiana, 36
Phlebodium aureum, 46, 135
Phymatodes, 77; lycopodioides, 77
Polypodium, 57, 113: auriculatum, 27: californicum, 19, 37, 38: crassifolium, 76; firmulum, 147: incanum, 45, 125; Maxonii, 147: per-

cussum, 125; polypodioides, 45, 46, 77, 83, 125, 134; Scouleri, 18, 38, 82; vulgare, 7, 18, 20, 21, 26, 27, 45, 57, 102; vulgare auritum, 7, 8, 25-27; vulgare bifido-cristatum, 8; vulgare cambricum, 7, 21; vulgare elongatum, 8; vulgare hastatum, 7; vulgare multifidum, 8; vulgare ovatum, 8; vulgare ramosum, 8; vulgare sinuatum, 8
Polypodium vulgare in Great Britain, 19
Polypodium vulgare in Maine, 7
Polypodium vulgare L. var. auritum Willd., 25
Polypody, Notes on the gray, 83
Polystichum acrostichoides, 61, 103; acrostichoides crispum, 8; acrostichoides incisum, 103; lonchitis, 16, 67, 69; munitum, 19, 39, 82; munitum solitarium, 147; solitarium, 147
PRETZ, H. W., 59; An interesting find, 137
Pringle, Cyrus Guernsey [biographical sketch], 114
Pteridium aquilinum, 47, 102; aquilinum caudatum, 46, 47; aquilinum longifolium, 88; caudatum, 77, 132
Pteridophyta of the arctic regions, The, 65
Pteridosperms, 11
Pteris aquilina, 15, 38; aquilina lanuginosa, 38; cretica, 45, 47; longifolia, 45, 47; mutilata, 76
RANSIER, H. E., extracts from letters, 16
Reviews: Ferns of the Transvaal, 44: The ferns of Mt. Apo, 83
RUGG, H. G. Cyrus Guernsey Pringle, 114
SAFFORD, W. E. Notes of a naturalist afloat—I, 121; Edward Palmer, 143
Sagenopteris, 106
Salpichlæna volubilis, 146
Salviniaceæ, 11
Schizæaceæ, 106
Schizæopsis, 106
Scolopendrium vulgare, 115
Selaginella, 16, 44; apus, 103; rupestris, 40, 45, 70; selaginoides, 70
SMITH, J. D. A collecting trip in southern Florida, 51
Some ferns found during 1909, Notes on, 12
Some Southern California ferns, 82
Southern California, Fern collecting in, 17
Southern California fern notes, 104
Southern California ferns, Notes on, 37
Southern California ferns, Some, 82
SPALDING, K. D. Ferns at home and visiting, 60
Species of ferns based on types collected by E. Palmer, 146
Stamford, N. Y., ferns, 12
Stations for Dryopteris Goldiana × marginalis in Vermont, New, 78
Steiropteris, 37
Stenochlæna japurensis, 125
Stigmatopteris, 37
Study of ferns, On the, 53
Study of fossil ferns, The, 105
Tectaria cinnamomea, 95; coriandrifolia, 77; heracleifolia, 77; martinicensis, 77, 133; trifoliata, 135
TERRY, E. H. Grace A. Woolson, 148
Transvaal, Ferns of the [a review], 44
Trichomanes, 126, 135; pyxidiferum, 134
Tropical American species of Dryopteris subgenus Eudryopteris, The, 93
Vermont, New stations for Dryopteris Goldiana × marginalis in, 78
Vittaria, 71, 77, 126; lineata, 47, 71
Vittarieæ, 71
Ware, R. A., 63
White Mountains, Lycopodium inundatum in the, 15
WINSLOW, E. J. A new hybrid fern, 22; Asplenium acrostichoides Sw., 79; The field meeting at Hartford, 115; Lycopodium flabelliforme, 141
Woodsia, 62, 68; alpina, 68, 114; glabella, 67, 68, 114, 118; ilvensis, 68
Woodwardia, 46, 105, 106; areolata, 46; radicans, 39, 82, 104; spinulosa, 18, 19
Woolson, Grace A. [biographical sketch], 148

ERRATA

P. 3, line 15 from below, p. 4, line 1, and p. 6, line 9, *for* Roth. *read* Roth (full name).

P. 7, line 14, *for* (L.) *read* L.

P. 7, line 8 from below, transpose (*H. W. Jewell*) after Farmington, and (*Miss E. S. Shaw*) after Island.

P. 8, lines 5 and 12, *for* (Moore) *read* Moore.

P. 8, line 11, for *elongata* read *elongatum*.

P. 8, line 11, *for* (H. W. Jewell) *read* (*H. W. Jewell*) [collector, not authority].

P. 16, line 5 from below, for *Seloginella* read *Selaginella*.

P. 26, footnote 3, *for* Painted *read* Printed.

P. 29, line 6 from below, for *Isetes* read *Isoetes*.

P. 30, line 12, for *andromedfolia* read *andromedifolia*.

P. 65, line 8, from below, for *Callinea* read *Calluna*.

P. 66, line 2 from below, *for* latitude *read* altitude.

P. 69, line 15, *for* 61' *read* —61°.

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CONTENTS

No. 1, for January, issued 29 February 1912

Notes of a naturalist afloat—II (Plate 1)
WILLIAM EDWIN SAFFORD 1

The Colorado Desert for ferns ..... F. T. PEMBER 12

Random notes on Bermuda ferns . HAROLD GODDARD RUGG 16

A new name for a Hawaiian fern ..... WILLIAM R. MAXON 19

A new fern from Panama ..... WILLIAM R. MAXON 21

A plea for fern protection ..... ORRA PARKER PHELPS 22

A new locality for Asplenium ebenoides
CHARLES H. BISSELL 24

Notes and news 25

Some literature on North American ferns, 1911 27

No. 2, for April, issued 11 May 1912

Notes of a naturalist afloat—III (Plates 2, 3)
WILLIAM EDWIN SAFFORD 33

Lycopodium selago from Ohio ..... LEWIS S. HOPKINS 46

Observations on some Lycopodiums of Hartland, Vt.
NANCY DARLING 49

Carl Frederik Albert Christensen: some biographical notes ..... R. C. BENEDICT 53

Letter to the members of the American Fern Society
ROBERT A. WARE 58

Some hybrid ferns in Connecticut ..... E. J. WINSLOW 63

Notes and news 64

No. 3, for July, issued 3 August 1912

Notes of a naturalist afloat—IV
WILLIAM EDWIN SAFFORD 65
Vermont, the fern lover's paradise
HAROLD GODDARD RUGG 83
Another station in central Vermont for Dryopteris filix-mas and for the new hybrid filix-mas × marginalis
F. E. CORNE 93
Notes and news 96

No. 4, for October, issued 18 December 1912

Notes of a naturalist afloat—V . WILLIAM EDWIN SAFFORD 97
Roughing it to the Yosemite .....H. HARWOOD TRACY 107
Further notes on the fern flora of Ohio . LEWIS S. HOPKINS 115
Outings for Onondaga moonwort and slender cliffbrake
H. E. RANSIER 119
Whittier's herbarium.....HAROLD GODDARD RUGG 121
A suggestion on the field study of ferns . PHILIP DOWELL 123
Notes and news 124
Index to volume 2 125

Vol. 2 JANUARY 1912 No. 1

American Fern Journal

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CONTENTS

Notes of a naturalist afloat—II (Plate I) William Edwin Safford 1
The Colorado Desert for ferns - - F. T. Pember 12
Random notes on Bermuda ferns Harold Goddard Rugg 16
A new name for a Hawaiian fern - William R. Maxon 19
A new fern from Panama - - William R. Maxon 21
A plea for fern protection - - Orra Parker Phelps 22
A new locality for Asplenium ebenoides Charles H. Bissell 24
Notes and news 25
Some literature on North American ferns, 1911 27

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A KEY WEST RESIDENCE EMBOWERED IN COCONUT PALMS
Photograph by Guy N. Collins

American Fern Journal

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Notes of a naturalist afloat—II

WILLIAM EDWIN SAFFORD

(Plate I)

The Florida Keys

The Florida Keys are a chain of low islands extending around the southern extremity of the peninsula from Cape Florida to the group known as the Dry Tortugas. They are in reality a continous coral reef and have been recently connected with the mainland by a railroad with a terminus at Key West.* The word "key", applied to these small islands, is a corruption of the Spanish "cayo," which still persists in the name of Cayo Largo. The name of Key West was originally Cayo Hueso or "Bone Key." From a biological point of view these islands are essentally West Indian instead of a part of the United States. They are important stations for the student of marine pelagic life, since they lie on the margin of the great Gulf Stream, which bears to their shores myriads of beautiful and interesting living organisms, many of which are still unknown to science.

On our arrival at Key West, April 15, 1881,† we found there Mr. Alexander Agassiz, who had just returned from the Dry Tortugas, where, with his associate Mr. J. Walter Fewkes, he had been spending some time for the purpose of studying Gulf Stream life. They had done some

* This road was completed in January 1912.

† The date of our departure from Aspinwall was April 9th, instead of March 9th, as stated in my preceding paper.

[No. 6 of the Journal (1; i-iv+121-155. pl. 5) was issued 29 N 1911.]

interesting work, including the completion of colored drawings of the Portuguese man-of-war and other related forms of surface life; but the stiff northern winds, which we had encountered on our way from Aspinwall, had driven the great stream to the southward of its usual course, and they were not so successful in their investigations as they had hoped.

When Mr. Agassiz found that I was interested in natural history, he earnestly advised me to forsake botany and all other branches that could be studied as easily by investigators living on shore, and to devote myself specially to the study of the surface life of the ocean; since so great a part of my life was to be spent upon it, and I would consequently have unusual opportunities for such work. I was much impressed by his enthusiasm, and I resolved to do as he advised. Before we left he sent me a list of books which he suggested that I buy as a nucleus of a working library, mostly works on the anatomy of marine invertebrates; and he added some practical directions for collecting surface material by means of a townet from the decks of a ship and for the preservation of living animals for study.

At this time I did not realize the difficulties which the serious study of natural history on board a man-of-war would entail. Collecting of curios is tolerated on board ship: many seagoing men bring home from their cruises portfolios of ferns or seaweeds, cases of butterflies or hummingbirds, and cabinets of coral and seashells; but, somehow, the study by a naval officer of a subject so foreign to his profession as natural history was considered out of place. It had better be left to the ship's doctor or perhaps to the chaplain, if he should have a taste for it. The knowledge of an average naval officer of biology may be illustrated by referring to two subjects of debate which I heard in the ward room of the *Powhatan*. The first was: "Is a whale a fish or an animal?" and the second

"What is a tomato, a fruit or a vegetable?" This is not surprising since no branch of biological science is included in the curriculum of the Naval Academy; and a midshipman may graduate without the slightest notion of what an animal or a plant is or of the general rudiments of botany and zoology, the formation of coral islands, the causes of ocean currents, or other kindred subjects.

Darwin, in his letters, speaks of the attitude of the officers of the *Beagle* toward his work while he was attached to that vessel as naturalist. The executive officer, or first lieutenant, he says, referred to his collections as "beastly devilment," and declared: "If I were skipper, I would soon have you and all your d—d mess out of the place."* Huxley encountered the same spirit on board the *Rattlesnake*. "The singular disrespect with which the majority of naval officers regard everything that lies beyond the sphere of routine," he writes, "tends to produce a tone of feeling very unfavorable to scientific exertions."

It was in consequence of my talk with Mr. Agassiz that I resolved to fit myself for scientific collecting on my future cruises; and I was afterwards sent to Yale University and the laboratory of the U. S. Fish Commission at Woods Holl with this object in view, chiefly through the influence of Professor Charles E. Munroe. Rear Admiral C. R. P. Rodgers, Rear Admiral John G. Walker, who was Captain of the *Powhatan* during part of my tour of duty on board her, and Rear Admiral Bowman H. McCalla, who was at this time our executive officer. I shall describe later how I tried to carry on serious work in natural history during a subsequent cruise, and how I was fired from my laboratory by the skipper, together with all my "d—d mess."

During the stay of the *Powhatan* at Key West and on several subsequent visits, I made a few notes on the vege-

* Darwin, Francis. Life and letters of Charles Darwin 1: 196. 1898.

tation of this island and the adjacent keys, and I afterwards amplified my notes by examining material in the U. S. National Herbarium at Washington. In the herbarium, I found plants from this region collected by Dr. Edward Palmer, Mr. A. H. Curtiss, Mr. Charles T. Simpson, and Mr. Guy N. Collins, who on an expedition to the Keys, in 1898, was accompanied by Messrs. C. L. Pollard and E. L. Morris.

In the town of Key West the most striking feature of the vegetation is the coconut palm (*Cocos nucifera*), groves of which embower residences of the better class and in places fringe the snow-white seabeach. Most of the ornamental plants I saw here were introduced species commonly found in tropical cities: scarlet-flowered *Hibiscus rosa-sinensis*; large oleanders with white, pink, and crimson flowers; *Thevetia neriifolia*, sometimes called the "yellow oleander," with golden yellow funnelshaped flowers, narrow leaves, and peculiar fruits, shaped like an inverted cocked hat; *Plumeria rubra* sometimes called "frangipanni," with clusters of large jasminelike white or rose-tinted flowers borne at the end of clumsy thick branches; a shrubby trumpet flower, *Tecoma stans*, which I had already noticed at Panama; the showy "flower fence" (*Poinciana pulcherrima*), belonging to the Caesalpiniaceae, with loose clusters of flowers having clawed petals variegated with red and yellow; several mimosalike shrubs including the sweet-scented *Acacia farnesiana*, with small fluffy yellow heads of flowers, and the pink-flowered *Albizzia julibrissin;* and a bush with small variegated pink and white leaves, which I afterward saw growing in hedges at Honolulu, and which proved to be *Phyllanthus roseapicta*.

Among the trees were several specimens of *Terminalia catappa*, with branches radiating in regular whorls from the straight upright trunk, leathery leaves, and almondlike nuts; the mournful-looking ironwood, *Casuarina*

equisetifolia, which I afterwards found so common on islands of the tropical Pacific; a banyan tree (*Ficus* sp.) with aerial roots, growing in the arsenal yard; a few small trees of the Chinaberry (*Melia azedarach*) with clusters of small violet-colored, or lavender flowers; and the so-called Jerusalem thorn (*Parkinsonia aculeata*), belonging to the Caesalpiniaceae, with clusters of bright yellow flowers and pinnate leaves with broad grasslike rachis and minute deciduous leaflets. In addition to these there was a rough-leaved tree I had never seen before, with clusters of flame-colored, petuniashaped flowers. This proved to be *Cordia sebestena*, belonging to the Boraginaceae. It was known at Key West as the "geiger tree," and its fruit was called "geiger berries." There were also a number of variegated crotons and Acanthaceae, and a few amaryllids growing in pots. But among the most showy of all the ornamental plants I saw, were two species of *Bougainvillea* which climbed over balconies and bowers. The first was the species most commonly seen in the tropics, with bright magenta bracts (*Bougainvillea glabra*), and the second a variety of *Bougainvillea spectabilis* with brick-red bracts and a less robust habit of growth, sometimes called *B. lateritia* by florists. I shall now try to give some idea of the spontaneous vegetation of the Florida Keys.

Ferns are not abundant. Perhaps the most interesting species is *Aneimia adiantifolia*, which grows on coral rock often among pine trees, as on No Name Key. Its fronds suggest those of certain Davallias I afterward collected in Polynesia, but its fruit is confined to two lower pinnae, which are especially modified like those of an *Osmunda*. Associated with it, *Pteris longifolia* is often found, and on certain palmettos the epiphytal sword fern, *Nephrolepis exaltata*, sometimes occurs, though this species is more common on the mainland.

Other ferns found on the keys are *Pteris caudata*,

sometimes regarded as a variety of the common *P. aquilina; Polypodium phyllitidis; P. polypodioides; Phymatodes exiguum* Und. (*Polypodium Swartzii* Baker), common on Cayo Largo, where it climbs over bushes; *Paltonium lanceolatum*, growing on trees, on old Rhodes Key; and on the shores of Biscayne Bay, at the eastern extremity of the Keys, occur all the species mentioned above together with *Dryopteris thelypteris* and *D. patens*.

The only conifer is *Pinus heterophylla*, also known as the Cuban pine, which is also found on the Bahama Islands. On the keys it is associated with *Thrinax microcarpa* and other palmettos.

Some of the palmettos are stemless or nearly so, as in the case of *Coccothrinax Garberi*, which grows along the shores of Biscayne Bay. Others have tall slender trunks and crowns of round fanshaped leaves, as in *Coccothrinax jucunda*, the blades of which are silvery white beneath and yellowish green above with orange-colored ligule at the base. The drupes of *Coccothrinax* are dark purple or blackish, while those of the genus *Thrinax* are white. The most common *Thrinax* is *T. microcarpa* with flowers, like those of *T. keyensis*, borne on disclike pedicels. The latter species is characterized by a large base of matted roots which raises the foot of the trunk above the surface of the ground. *Thrinax floridana* is distinguished by fragrant, aromatic flowers borne on slender pedicels. It has a slender somewhat tapering trunk partially clothed with the persistent bases of the old leaves.

On several of the keys occurs *Agave decipiens*, a plant of an apple-green color resembling *Aloe vera* but useless except for its saponaceous roots. It should not be confused with the valuable *Agave sisalina*, which was introduced into southern Florida about the year 1834 by Dr. Perrine, the United States Consul at Campeche. Mr. Lyster H. Dewey of the Bureau of Plant Industry, who

went, in 1910, to Sugarloaf Key for the purpose of transplanting plants of *A. sisalina*, introduced upon that island several other useful fiber plants, including *Agave zapupe* from eastern Mexico and *Furcraea cabuya* from Costa Rica. The bulbules of *Agave decipiens*, which resemble those of *A. sisalina*, have sometimes been sold to unsuspecting colonists for those of the true fiber-producing Sisal.

The mangroves are perhaps the most important agent in land formation on the Florida Keys. I have already referred to those of the Isthmus of Panama. The accompanying figure of *Rhizophora mangle*, reproduced from a photograph by Mr. Guy N. Collins, shows the beginning of an islet near Sugarloaf Key and illustrates in a striking manner how the arched roots can collect floating debris borne by the currents, like the teeth of a great comb. This material in time becomes black mud and offers an inviting foothold for the various plants usually found associated with the mangroves.

In addition to *Rhizophora mangle*, several other mangrovelike plants occur on the keys, but none of them have the peculiar arched roots which characterize this species. *Conocarpus erectus*, the "button mangrove," can be recognized by its small alderlike cones. *Laguncularia racemosa* has peduncled spikes of small tubular flowers, leathery ribbed fruit, fleshy and veinless leaves bearing a pair of glands on the petiole. This is usually called the white mangrove, to distinguish it from *Avicennia nitida*, the black mangrove, which I saw growing near Aspinwall. The flowers of the black mangrove are so rich in nectar that the bee keepers of eastern Florida transport their hives to the coast at the time of its blooming, and "black mangrove honey" obtained in this way is among the finest honeys of the market and commands a fancy price.

Among the shrubs growing spontaneously at Key West

are *Randia aculeata*, belonging to the Rubiaceae, sometimes called the inkberry, with clustered spatulate leaves and jasmineshaped flowers; *Bursera simaruba*, sometimes called "gombo limbo," a corruption of "goma elemi," one of its Spanish names, so called from the aromatic masticlike gum derived from it; *Mimusops Sieberi*, locally known as the wild sapodilla, or naseberry (Spanish "nispero," medlar) a plant with beautiful, finely feather-veined leaves; and the poisonous sumac, *Rhus metopium*, which bears red berries.

Many of the strand plants are common tropical species of wide distribution. Among them are *Sesuvium portulacastrum*, often called seaside purslane; a seaside bean, *Canavalia obtusifolia*, with leathery trifoliolate leaves, often associated with the goatsfoot convolvulus (*Ipomoea pes-caprae*), which also spreads over the sandy beaches; *Guilandina crista* (*Caesalpinia bonduc* and *C. bonducella*), a scrambling shrub armed with recurved prickles and bearing broad prickly pods containing the hard stony gray or yellow spheroid seeds known as nicker nuts, so often seen in collections of "seabeans;" *Heliotropium parviflorum* and *H. curassavicum*, tropical weeds belonging to the Boraginaceae, with inconspicuous flowers; *Lippia nodiflora*, sometines used for making lawns in situations where grass will not grow; and, climbing over bushes, a weak-stemmed plant bearing auricled leaves and flowers with blue stamens, which proved to be *Plumbago scandens*.

Among the composites are a shrubby *Baccharis* with resinous leaves; a coarse ragweed, *Ambrosia hispida;* a blue-flowered *Ageratum; Borrichia frutescens*, a hispid plant with yellow-rayed heads; and *Parthenium hysterophorus* with pinnatifid leaves and with heads of flowers having a few broad white rays.

But there is not space here to give a complete list of the strand plants. Some of them belonged to genera represented by allied species on the Pacific islands. Thus

RHIZOPHORA MANGLE, the common mangrove, beginning an island.
Photograph by Guy N. Collins

Tournefortia gnaphaloides, belonging to the Boraginaceae, is represented in Polynesia by *T. argentea;* and *Scaevola Plumieri*, allied to the Lobeliaceae, with flowers having a peculiar 5-lobed corolla split down on one side, is represented there by *Scaevola Koenigii;* while *Maytenus phyllanthoides*, with leathery leaves and bright red three-valved seedpods, belongs to an interesting genus of Celastraceae, represented in the Straits of Magellan by *Maytenus magellanica*, and in the Galapagos Islands by *M. obovata.*

While at Key West, our fare was pleasantly varied with turtle meat, which was sold in the market like beef or mutton, and excellent fish of many kinds. The favorite of all the fishes both on account of its excellence for the table and the sport it affords to the fisherman is one allied to the Spanish mackerel and called the kingfish or sierra, *Scomberomorus cavalla*, which comes in immense numbers to the Florida Keys and is caught there from November till April. Its usual weight is about six to ten pounds, but it is often much larger. It is caught by trolling and is rivaled only by the tarpon in the estimation of the sportsman, but it is infinitely superior to the latter in the eyes of the epicure. Among other fine fish were the mangrove snapper or pargo prieto (*Neomaenis griseus*), which our men caught in great numbers over the ship's side, the mullet or liza (*Mugil curema*), and the beautiful spotted cabrilla (*Epinephelus guttatus*), which also affords good sport.

It was an interesting sight to stand on the edge of the wharf and look down into the clear water at the tetradons and other bright-colored and curiously variegated fishes nibbling at the barnacles and coral; and in the adjoining basin was an inexhaustible supply of mullets, snappers, and other food fishes.

There is not space here to describe the various types of mankind which form the population of Key West: the

Conchs, as the natives of the Bahama Islands, probably descendants of the old Buccaneers, are called; the Cuban cigar-makers, and the motley collection of negroes. Spanish is much spoken, and the language of the Bahama Islanders can scarcely be recognized as English when first heard.

At one shop kept by a Bahama woman and her daughter I saw some beautiful seashells, artificial flowers, and other objects made of shells, some of them quite pretty and others atrocious. Among the shells were great "king conchs" (*Strombus gigas*) with rough exterior and exquisitely polished rose-colored lining; "queen conchs" (*Cassis* sp.) which are also called helmet shells; pretty cone shells, olive shells, murices, and cowries. Of the bivalves, perhaps the most remarkable was the Venus-shell (*Cytherea dione*), specimens of which I had before seen at Aspinwall. In addition to these there were purple and orange-colored gorgonias or sea fans; corals of many kinds, staghorn coral, brain coral, mushroom coral, and other forms which had no names; dried star-fishes and sea urchins; and sponges of many forms, some of which were like great goblets and others like cylindrical chimneys.

Under the eaves of many of the houses hung cages with birds of various kinds in them: cardinals, mockingbirds, and finchlike birds of several species. I bought a beautiful painted finch or "mariposa" (*Cyanospiza ciris*), the plumage of which was variegated with apple-green, scarlet, blue, crimson, and purple. This I carried home with me at the end of the cruise together with an indigo bird (*Cyanospiza cyanea*), which was blown on board the *Powhatan* during our passage from Aspinwall to Key West. It is interesting to note that the latter was greeted on the morning after his arrival in southern Ohio by birds of his own species, a pair of which had their nest in a neighboring orchard. So eager was he to join them that

his owner opened the door of the cage and set him free. Whether he ever returned to his new home after having migrated southward, or whether he found his way back to the Bahama Islands from which he had probably been blown, I do not know; but I do know that he was a happy little bird when he escaped from his confinement, and as if trying to express his gratitude he perched on a limb near the house and sang a little song of joy.

The Colorado Desert for ferns

F. T. PEMBER

As most people know, the Colorado Desert is mostly in California but takes its title from the great river of that name, which forms the eastern boundary of the state. It is over 200 miles long, extending from Banning on the north, not only to but far beyond the Mexican line on the south. Its thousands of square miles of hills and valleys, drifting sand dunes, and black lava rocks, are in most part as utterly barren and lifeless as anything on earth, though in places creosote bushes, greasewood, various cactuses, and other desert plants grow here and there and with the daily mirage lend interest amid the general desolation. The scant rainfall of 2½ to 3 inches yearly is what makes the region a desert. It is hot in winter but worse in summer, with an almost unbearable temperature of 115° to 118° F. in the shade. The last place in the world to look for ferns, you will say. So it is, and none exist in the open desert. But on its western side the San Jacinto Mountains rise to a height of 11,000 feet, are covered in part with pine forests, and hold the winter's snow most of the year. When the snow melts, it sends clear cold streams down each rocky canyon, only to be lost in the desert sands. At the base of these mountains is a level tract of desert land of some 10,000

acres, which is protected from the prevailing desert winds by outlying hills and mountains. This has a wonderful mineral, health-giving, hot spring, about which a little hamlet has grown, called Palm Springs, which is becoming famous as a resort for consumptives; and many cures are reported. The mountain canyons that debouch into this basin are Chino, West, Andreas, Murray, Palm, and others. The last is the home of the famous *Neowashingtonia filifera*, and holds groves of it miles in length, the trees standing 70 to 90 feet high. These canyons have some splendid waterfalls and all can be followed far back into the range; but progress is slow, for they are full of rocks, boulders, cactus, mesquite, and a multitude of other stiff shrubs, all of which have thorns or fishhook claws that cling to one persistently all the way.

It has been my fortune to have explored this entire section at different times, but then I was collecting birds for our home museum and devoting little time to botanical studies.

I explored this region in 1887, and again in 1890, and in February 1911 I found myself there once more; this time for the purpose of collecting as many ferns as possible, though knowing that the number would not be large.

As we approach the mouths of any of the canyons, and while yet the country is very arid, we find in abundance, on the north side of the rocks and boulders, the beautiful *Notholaena Parryi* D. C. Eaton. The little fronds are 3 to 4 inches long and have some resemblance to the cotton fern, *N. Newberryi* D. C. Eaton. A little farther on we come to plenty of *N. cretacea* Liebm., a most lovely little triangular frond about 2 inches long and wide. Growing with it, and all the way up the canyons, are quantities of *Gymnopteris triangularis* (Kaulf.) Underw., or the celebrated gold-backed fern. I call it so for want of another name, for while I have collected thousands of fronds of this species elsewhere and ought to know it,

here the growing plants have a wholly changed look. But in dried specimens it is hard to point out differences, except that they are smaller and the stipes so brittle or jointed that it is next to impossible to keep them full length, as they break off an inch or half inch from the frond. I have never noticed this feature in the species from other places and it may be owing to environment, but I predict that some botanist will yet give it specific rank. These three species are all that are common and all that I found in some canyons. A ten-mile tramp to and from Chino Canyon gave me the very rare *Cheilanthes viscida* Dav., a small tufted fern with fronds 4 to 5 inches long, and so sticky that when dried they stick fast to both sheets, and unless much time is spent over it the frond will be about equally divided between the two sheets. Far up Chino Canyon, where immense sulphur springs furnish plenty of water, is an acre or two of *Pteridium aquilinum* (L.) Kuhn. This was out of season, the fronds being too old or too young, but here is where someone makes another species. The old fronds were 4 to 6 feet high and had lost to a great extent their ternate division, the two lower pinnae being smaller in proportion while the main rachis was erect and showed 6 to 8 pairs of side pinnae, thus changing the general look of the plant from that of the east and south. One day I went to a small, steep, rocky canyon, where the only way to travel was by clambering over boulders or jumping from one to another, and when I thought I had gone about as far as possible, I came to a spring over which the rocks formed a projecting hood so that the sun never shone on it. Over this, on a flat rock some 12 feet across and moistened by dropping water, was the freshest, most luxuriant and perfect bed ever seen of *Adiantum capillus-veneris* L., the lovely Venus-hair fern. There seemed to be thousands of large beautifully fruited fronds that would repay a collector for all desert hardships. In this

ideal spot for shade and water, at 1,000 feet elevation, in the perfect calm of this protected valley, but amid the scorched and blistering rocks, one can look between the hills far out on the desert till vision is obscured by swirling sandstorms. These six ferns were all I found, but others and some rarer ones have been taken later in the season in these mountains. I may add that *Selaginella Bigelovii* Underw. was abundant, as it is over most of California.

A hundred miles farther north, on Slover Mt., I secured the rather rare *Cheilanthes Cooperae* D. C. Eaton. In other sections of the state I collected *Polypodium californicum* Kaulf.; *P. Scouleri* H. & G.; *Woodwardia spinulosa* Mart. & Gal.; the intricate lace fern, *Cheilanthes gracillima* D. C. Eaton; cotton fern, *Notholaena Newberryi;* a maidenhair, *Adiantum Jordani* C. Muell.; coffee fern, *Pellaea andromedifolia* (Kaulf.) Fée.; bird-foot fern, *P. ornithopus* Hook.; *Polystichum munitum* (Kaulf.) Presl, and var. *inciso-serratum* D. C. Eaton; *Cheilanthes Fendleri* Hook.; *Dryopteris rigida arguta* (Kaulf.) Underw.; and *Equisetum telmateia* Ehrh. This last has sterile stems 6 feet tall and where plentiful makes a fine display.

Many of the California ferns I have not yet collected, even after many winters spent in the state; but could I be there in June and July and go among the great mountain ranges and through the moister northern sections of the state, I feel sure I would secure some of them; and I live in hope that I may yet do so.

GRANVILLE, N. Y.

Random notes on Bermuda ferns

HAROLD GODDARD RUGG

The person who has lived in New England all his life is usually anxious to escape the typical New England slush and mud season of April—"the betwixt and between," as it were. For such a person, seeking a refuge where he may find agreeable weather and a place in which to botanize, "sunny" Bermuda has its attractions. Yet he must not expect to find Bermuda always sunny, and he must be willing to experience seasickness.

For the fern student alone, Bermuda may be disappointing. Instead of a great number of luxuriant ferns, as one might expect, the island boasts of only twenty-five species and varieties, according to an article by the late B. D. Gilbert in the Bulletin of the Torrey Botanical Club [**25:** 593–604. 16 D 1898]. Doubtless this list of Gilbert's, which I found extremely helpful, may need some corrections and some additions. In the library at Hamilton, Bermuda, I consulted two or three books relating to the flora of the islands. Of these the most valuable were the botanical volumes of the Reports of the Challenger Expedition. Some of the Bermuda ferns are extremely rare, and fortunate indeed is the botanist who finds them all. Bermuda has so many attractions that I was able to give but little time to ferns alone. Yet, in my desultory collecting I succeeded in finding specimens of all the species mentioned in this article.

Undoubtedly the most abundant fern in the islands is the little maidenhair, *Adiantum bellum* Moore. This rock-loving fern is found everywhere, growing on walls, in stone quarries, around the caves, and in almost every roadside cut. In dry exposed places the fronds are barely two or three inches long. Nevertheless these small fronds are very heavily fruited. Whenever this fern is found in moist, shady places, as in the cave regions

of Walsingham, the fronds are often eight inches in length and not so heavily fruited. These specimens doubtless approach the variety *walsingense* named by Gilbert. At Fern Cave, a cave well named, on the estate of the German consul, I found specimens of an *Adiantum* which Dr. R. C. Benedict, who has kindly examined my Bermuda specimens, identified as *A. tenerum* Sw., a species not given in Gilbert's valuable list.

Another fern common about the city of Hamilton, on the walls and roadside cuts, wherever a particle of earth has lodged, is *Pteris longifolia* L. Wherever this plant has secured a footing in good rich soil at the base of some wall or similar situation, it bears fronds fourteen inches long or longer.

The other ferns of the island seem confined for the most part to one of two places, the so-called marshes, in three of which I botanized, and the Walsingham tract. In this latter place are numerous limestone caves and sink holes about which the ferns grow. Of the marshes, Devonshire is probably the largest. This marsh, acres and acres in extent, is completely covered with a growth of ferns. Most abundant of all is our own cinnamon fern, *Osmunda cinnamomea* L. Here I found one frond of the variety *frondosa* Gray. Common also are the chain fern, *Woodwardia virginica* (L.) Sm., the royal fern, *Osmunda regalis* L., the brake, *Pteridium caudatum* (L.) Maxon, and *Acrostichum excelsum* Maxon. This fern, found also in Paget Marsh, is luxuriant in growth and often attains a height of eight feet. Another fern native to the United States, *Dryopteris thelypteris* (L.) A. Gray, was found sparingly in Devonshire and Pembroke marshes. Pembroke Marsh, several acres in area, is drained by a ditch, four or five feet in width, the surface of which is in places completely covered with *Salvinia natans* Hoffm. and the water hyacinth.

Another rather common fern, found along the borders

of Devonshire Marsh and along the roadside in a few places is *Dryopteris patens* (Sw.) Ktze.

On a wall along the middle Devonshire road small plants of an *Asplenium* were found which Doctor Benedict calls *A. trichomanes* L. Certainly the plants seem exactly like those of our own species. At first I called them dwarfed or stunted plants of *A. muticum* Gilbert, for which I had been looking, but probably the true *A. muticum* is found only in the Walsingham tract. The fronds of this pretty fern as found in Walsingham, grow nearly erect, are ten or more inches long, and bear pinnae more finely cut than those of our *A. trichomanes*. In crevices of rocks in this same Walsingham tract is found *Polypodium plumula* HBK. and the rare interesting fern ally, *Psilotum nudum* (L.) Griseb. Other botanists report finding magnificent specimens of this odd plant growing at the bases of the trunks of palmetto trees in Paget Swamp. Fairly abundant in the Walsingham region are *Nephrolepis exaltata* Schott and *Asplenium dentatum*, a delicate little fern found on moist rocks about Joyce's Doch Cave, Church Cave, and Fern Cave. At Church Cave, once famous for its rare ferns but now nearly stripped of them all, I found but two plants of the rare *Anopteris heterophylla* (L.) Diels, while at Joyce's Doch Cave I found a single sterile frond of a fern as yet unidentified. The last ferns on my list are *Dryopteris Speluncae* (L.) Und., two plants of which were found in Paynter's Vale, and *Dryopteris bermudiana* (Baker) Gilbert, an endemic species.

Ferns are not abundant in Bermuda. One might spend a day in driving, and without passing one of the three large marshes would probably see only two ferns, *Pteris longifolia* L. and the ever-abundant maidenhair, *Adiantum bellum* Moore, found so far only in Bermuda.

A set of nearly all the species collected has been deposited in the herbarium of the American Fern Society.

HANOVER, N. H.

A new name for a Hawaiian fern*

WILLIAM R. MAXON

The fern illustrated in the accompanying figures is a Hawaiian species of *Polypodium*, *P. minimum* Brack.,

POLYPODIUM SAFFORDII Maxon
a, natural size; *b*, three times natural size.

which, on account of an earlier use of the same name by Aublet for a South American plant, must be renamed. It may be known as:

Polypodium Saffordii Maxon nom. nov.
Polypodium minimum Brack. U. S. Expl. Exped. **16**: 5. 1854; not Aubl. 1775.
TYPE LOCALITY: "Mountains behind Honolulu, Oahu."
DISTRIBUTION: Known only from the Hawaiian Islands.

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ILLUSTRATION: U. S. Expl. Exped. **16**: *pl. 1. f. 3.*

The following specimens* have been examined:

OAHU: On and near the summit of Konahuanui, *Heller* 2905 (N, Y, M). Mountains behind Honolulu, *Wilkes Exped.* (N, Y, E). Without locality, altitude 3000–4000 ft., *Mann & Brigham* 550 (N, G, E, M); altitude 2000 ft., *Baldwin* (E).

HAWAII: Without locality, *Lichtenthaler* (N).

KANAI: Trunks of trees, altitude 3000 ft., *Baldwin* (E). Without locality, *Hillebrand* (Y).

In addition are several specimens (Y, N), collected by Baldwin (no. 85) and by Hillebrand, marked merely "Hawaiian Islands."

The relationship of *P. Saffordii* is with *P. serrulatum* (Sw.) Mett., a diminutive tropical American species which occurs also in Africa. The status of this and several allied species will shortly be discussed in a more extended paper.

FIGURE *a* represents a plant at natural size; FIGURE *b* represents sections of a frond at three times natural size. All are drawn from Heller's 2905 in the U. S. National Herbarium.

The name is given in honor of Mr. W. E. Safford, of Washington, D. C., whose collections, made during his service in the U. S. Navy, have been generously donated to the U. S. National Herbarium.

WASHINGTON, D. C.

*E = D. C. Eaton Herbarium, at Yale University; G = Gray Herbarium, Harvard University; M = herbarium of the Missouri Botanical Garden; N = U. S. National Herbarium; Y = Underwood Fern Herbarium, New York Botanical Garden.

A new fern from Panama*

WILLIAM R. MAXON

The following new species of *Dicranopteris* was noted recently in determining a duplicate set of the ferns collected in Panama by Mr. R. S. Williams, of the New York Botanical Garden, in 1908:

Dicranopteris Williamsii Maxon sp. nov.

Rhizome short-creeping, closely branched, slender, about 2 mm. in diameter, castaneous rather freely radicose, sparsely clothed with spreading coriaceous lanceolate-attenuate rigidly spinescent-ciliate scales about 1.5 mm. long; primary leaf-axes borne about 1 cm. apart, slender, 1.2 mm. in diameter, about 35 cm. long, light brown from a castaneous base, terete, and glabrous below the first pair of primary branches, above these olivaceous, delicately and deciduously squamulose (the scales minute, fimbriate-stellate), and bearing an occasional larger dark scale similar to those of the rhizome; primary branches 2 pairs, 11 cm. apart, provided with small deeply laciniate foliaceous stipules, simple, 26 to 30 cm. long, 3.5 to 5 cm. broad, narrowly oblong-lanceolate, acuminate, pectinate throughout, the rachis light brown, very narrowly marginate above, convex below, and bearing a few scattered rigidly long-ciliate stiff opaque dark-castaneous ovate scales about 0.75 mm. long; pinnules (segments) 40 to 50 pairs, distant (4 to 6 mm. apart), all at right angles to the rachis, linear, adnate, very slightly surcurrent, acutish, 2 to 2.8 cm. long, 2.5 to 3 mm. broad, the margins entire and lightly revolute, the costae evident and glabrous above, elevated below and bearing occasional minute yellowish to yellowish brown deeply laciniate scales; veins 25 to 35 pairs, nearly at right angles to the costa, once forked at the base, evident on both surfaces; sori few, 3–5-sporangiate, medial or slightly inframedial, seated upon the anterior branch; leaf tissue delicately herbaceous, yellowish green above, slightly glaucous below.

* Published by permission of the Secretary of the Smithsonian Institution.

Type in the U. S. National Herbarium, no. 579209, collected near Cana, Panama, April 17 to June 8, 1908, by R. S. Williams, no. 917.

D. Williamsii is related to *D. orthoclada* (Christ) Underw. of the interior mountain region of Costa Rica, a species which differs widely in its glabrous condition throughout, its shorter and broader branches, its somewhat flexuous rachises, its few and conspicuously surcurrent segments, its much heavier costae, and its widely branched veins.

The peculiar morphology of the family Gleicheniaceae, represented in America by the genus *Dicranopteris*, is discussed at some length in a paper by Dr. Underwood.* which is doubtless available to many members of the American Fern Society. Most of the species grow on barren, open or partially shaded slopes, often in very great profusion and forming dense, tangled thickets of wide extent. The commonest North American member of the genus is *Dicranopteris bifida*.

WASHINGTON, D. C.

A plea for fern protection

ORRA PARKER PHELPS

In the year 1869, the Connecticut legislature passed an act prohibiting the gathering of the climbing fern, *Lygodium palmatum*. Prior to that time, this beautiful fern had been extensively collected and sold for decorative purposes. Since the passing of the act, I am told by those who have lived in the climbing fern regions, it has recovered from its threatened extinction and again makes beautiful its chosen swamps and fields.

At the present time the wooded hills are each summer infested by swarms of men and boys who come from the

* Bull. Torrey Club 34: 243–262. 1907.

large cities and ship bale after bale of our hardy ferns to the florists. The land owners do not seem to care to put a stop to this thieving, though if so much as a hen were taken from the farm yard, there would doubtless be a flourish of shotguns.

It has been argued that as the ferns are perennials the frond harvest does no harm. But many of the ferns gathered are shallow-rooted; the men work very hurriedly, for haste pays; and their path through the woods is marked by a windrow of broken rootstocks. How long does it take a fern to come from the spore to maturity? Surely no less than six years, probably much longer. But suppose the fronds were carefully collected, what of the scattering of spores for the production of new ferns?

When the harvest first began to be yearly gathered, the work was done in the fall after the spores were ripe and scattered. Every year it has begun a little earlier, till the past June I saw six bales of ferns, each containing from 5,000 to 6,000 fronds, waiting for shipment at a little country station. The ferns were *Aspidium marginale*, *A. spinulosum* and varieties, and *Polystichum acrostichoides*. On none of the fronds did the spores seem to be ripe and some fronds were still so young that the tips were not fully developed.

Is not this traffic a menace to our fern flora? Is it not within the province of the American Fern Society to take some steps toward securing for future generations one of the chief beauties of our woods?

SAILSBURY, CONN.

A new locality for Asplenium ebenoides

CHARLES H. BISSELL

The so-called "Scott's Spleenwort" is so rare that its discovery in a new locality should be of general interest. So far as Connecticut is concerned it has been known only from the northwestern corner of the state. One plant was found in the town of Canaan by Mr. J. S. Adam, in 1876. This plant lived and flourished for about 15 years, but no other plants of the fern were found near it and this one at last disappeared.

In 1902, Mr. C. K. Averill found another plant in the same town but at a station several miles from the other. The species is, or was recently, known to grow in the town of Sheffield, Mass., only a few miles from the stations reported, so that the fern has been known in this general region for about 35 years.

At all the places named above, it was growing on shaded ledges of limestone and where both *Asplenium platyneuron* and *Camptosorus rhizophyllus* are also found.

Recently Mr. H. C. Bigelow has made a systematic search for this fern in central Connecticut and has been rewarded by the discovery of it in two localities in the town of Berlin, about 40 miles from the Canaan region In and about Berlin are extensive ridges of trap rock running mostly in a direction from southwest to northeast and ordinarily with an elevation of several hundred feet. Paralleling these trap ridges are low outcrops of sandstone and shale, the strata of which are tilted, giving usually a northwestern exposure, and it was among these outcrops that the Scott's fern was found. In all Mr. Bigelow has discovered seven plants at these new stations. These grew in crevices of soft shale and about midway between the base and the top of the ledge. Both *Asplenium platyneuron* and *Camptosorus* are found on many of these shale ledges, and there were places where condi-

tions seemed ideal for hybridizing, some really much better, apparently, than those where the hybrid was actually found. In one instance it was some little distance from Scott's fern to where its supposed parents were growing. It does not seem here to be as nearly evergreen as either the ebony spleenwort or the walking leaf, the fronds in the spring being mostly withered.

There are many similar ledges in the surrounding country, and if they could be examined with as much care and with as clear an eye as Mr. Bigelow has used in his explorations I believe we should have reports of other places in Connecticut where Scott's fern is growing.

SOUTHINGTON, CT.

Notes and news

At the recent annual meeting of the Torrey Botanical Club Professor Edward S. Burgess was elected president, Dr. John Hendley Barnhart and Professor Herbert M. Richards vice-presidents. Mr. Bernard O. Dodge secretary and treasurer, and Dr. William Mansfield delegate to the Council of the New York Academy of Sciences. Professor R. A. Harper was elected associate editor in the place of Dr. Tracy E. Hazen, who declined reelection. The other associate editors and the editor were reelected. Among the names of new members elected at the meeting was that of Professor Lewis S. Hopkins, Secretary of the American Fern Society.

At the winter meeting of the American Association for the Advancement of Science Dr. Edward C. Pickering was elected president. Dr. Duncan S. Johnson, professor of botany at Johns Hopkins University, was elected vice-president of Section G (Botany).

At the third annual meeting of the American Phytopathological Society Dr. G. P. Clinton was elected president, Mr. F. C. Stewart vice-president, and Dr. C. L. Shear secretary-treasurer.

At the annual meeting of the Botanical Society of America the following officers were elected: Dr. L. R. Jones president, Dr. B. M. Duggar vice-president, Dr. G. T. Moore secretary, and Dr. Wm. Trelease councilor. Other councilors are Dr. C. L. Shear and Dr. R. A. Harper, with Dr. Arthur Hollick, the treasurer.

At the meeting of Sullivant Moss Society, held in Washington, D. C., Dec. 29, 1911, the following officers were elected: President, Dr. A. W. Evans, New Haven, Conn; vice-president, Miss Caroline Coventry Haynes, New York City; secretary, Mrs. Eva B. Gadsby, Germantown, Pa.; treasurer, Mrs. Annie Morrill Smith, Brooklyn, N. Y. editor in chief, Dr. A. J. Grout. New Dorp N. Y.

Additions to the list of members and subscribers:

Baxter, M. S., 75 State St., Rochester, N. Y.
Butler, Mrs. Will, Cavendish, Vt.
Free Public Library, Worcester, Mass.
Friedländer, R. & Sohn, Karlstr. 11, N. W. 6, Berlin, Germany
Library of Congress, Washington, D. C.
Mount Holyoke College Library, South Hadley, Mass.
Nolan, Dr. Edw. J., Acad. Nat. Sci., Philadelphia, Pa.
Shreve, Dr. Forrest, Desert Laboratory, Tuscon, Ariz.
Tiedémann, Carl, 21 Bertha Place., Stapleton, N. Y.
Weatherby, C. A., 749 Main St., East Hartford, Conn.
Weigel, Oswald, Königstrasse 1, Leipzig, Germany.

Some literature on North American ferns, 1911

NOTE.—Some of the publications here listed contain the mere mention of ferns, while others deal primarily with ferns or other pteridophytes.

Allen, R. F. Studies in spermatogenesis and apogamy in ferns. Tran. Wisconsin Acad. Sci: **17:** 1-56. *pl. 1-6.* O 1911.

Benedict, R. C. *Botrychium Jenmani* in Cuba. Am. Fern Jour. **1:** 98, 99. 7 Au 1911.

Benedict, R. C. Do ferns hybridize? Science II. **33:** 254, 255. 17 F 1911.

Benedict, R. C. The genera of the fern tribe Vittarieae: their external morphology, venation, and relationships. Bull. Torrey Club **38:** 153–190. *pl. 2–8.* 5 My 1911.

Benedict, R. C. A new Cuban fern. Am. Fern Jour. **1:** 40–43. *pl. 2.* 13 F 1911.

Aneimia nipeensis.

Berry, E. W. Contributions to the Mesozoic flora of the Atlantic coastal plain—VII. Bull. Torrey Club **38:** 399–424. *pl. 18, 19.* 6 O 1911.

Berry, E. W. A Lower Cretaceous species of Schizaeaceae from eastern North America. Ann. Bot. **25:** 193–198. *pl. 12.* Ja 1911. [Illust.]

Blanchard, W. H. *Lycopodium complanatum* near Hartland, Vermont. Rhodora **13:** 211, 212. 9 O 1911.

Blanchard, W. H. *Lycopodium flabelliforme.* Rhodora **13:** 168–171. 21 Jl 1911.

Blake, S. F. Pteridophyte notes from eastern Massachusetts. Rhodora **13:** 101–103. 5 Je 1911.

Brainerd, E. New stations for *Dryopteris Goldiana* × *marginalis* in Vermont. Am. Fern Jour. **1:** 78, 79. 3 My 1911.

Brause, G. Cyatheaceae. Polypodiaceae. (In Urban, Nova genera et speeies V.) Symb. Ant. 7: 151-156; 156-160. 15 D 1911.

Britton, E. G. Fern collecting in Cuba. Am. Fern Jour. **1:** 75–77. 3 My 1911.

Cary, M. A biological survey of Colorado. N. Am. Fauna **33:** 1–256. *pl. 1–12 + f. 1–39.* 17 Au 1911.

Charles, G. M. The anatomy of the sporeling of *Marattia alata.* Bot. Gaz. **51:** 81–101. *pl. 9-12 + f. 1-3.* 16 F 1911.

Christ, H. Filices Wilsonianae. Bot. Gaz. **51:** 345–359. *f. 1, 2.* 17 My 1911.

Christ, H. On *Psomiocarpa,* a neglected genus of ferns. Smithsonian Misc. Coll. **56**[23]**:** 1–3. *pl. 1 + f. 1.* 21 N 1911.

Includes *Psomiocarpa Maxoni* sp. nov. from Jamaica.

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Cleveland, G. F. Ferns of the Isthmus of Panama. Am. Fern Jour. **1:** 111–113. 7 Au 1911. [Illust.]

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Ferriss, J. H. The finding of *Asplenium alternans*. Fern Bull. **19:** 36–38. 1911.

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Flynn, N. F. The sixteenth annual meeting of the Vermont Botanical Club. Rhodora **13:** 237, 238. 25 N 1911.

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Hopkins, L. S. A new variety of the cinnamon fern. Am. Fern Jour. **1:** 100, 101. 7 Au 1911. [Illust.]

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CONTENTS

Notes of a naturalist afloat—III (Plates 2, 3) WILLIAM EDWIN SAFFORD 33

Lycopodium selago from Ohio - LEWIS S. HOPKINS 46

Observations on some Lycopodiums of Hartland, Vt. NANCY DARLING 49

Carl Frederik Albert Christensen: some biographical notes (Portrait) - - - - - R. C. BENEDICT 53

Letter to the members of the American Fern Society ROBERT A. WARE 58

Some hybrid ferns in Connecticut - - E. J. WINSLOW 63

Notes and news 64

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TREE FERN, CYATHEA ARBOREA (L.) J. E. Sm.
Luquillo Mountains, Porto Rico

American Fern Journal

Vol. 2 APRIL, 1912 No 2.

Notes of a naturalist afloat—III

WILLIAM EDWIN SAFFORD

(Plates 2, 3)

Porto Rico

The island of Porto Rico is situated in the path of the moisture-laden trade winds. It has an abundant rainfall, yet such is the nature of its topography that the northern part gets more than its share of water while the southern coast is comparatively arid and is covered with xerophytic vegetation.

On my first visit to the island it seemed a vision of paradise as the mists cleared away and revealed the mountains of Luquillo with their silvery, threadlike cascades and the cloud-capped peak of El Yunque rising from their midst. On my second visit, sixteen years later, when I landed on the south coast amid scrubby Cactaceae and other desert plants, it suggested rather a scene from the inferno.

It was on St. Valentine's day, February 14, 1882, after a rough eight days' passage from Norfolk, that we found ourselves a little to the eastward of our reckoning, off the northeastern corner of the island. Our dignified old vessel had taken advantage of the gale to behave in a most frisky and unseemly manner, like a dowager in carnival time. Nearly everybody on board, including the captain, had been seasick and we were all anxious

[No. 1 of the Journal (2: 1–32. *pl. 1*) was issued 29 F 1912.]

to get ashore. I remember the apple-green stretches of sugar cane, as we steamed along the north coast back to the entrance of San Juan harbor; the little huts nestling under palm trees along the shore; the schools of flying-fish which scurried out of the way of the pilot boat that came out to meet us, like grasshoppers from the path of a rambler through summer fields; the consequential little Spanish pilot who did not know a word of English, for whom I was obliged to act as interpreter; the venerable Castillo del Morro, guarding the narrow entrance to the landlocked harbor; the swarm of bumboats coming out to sell us "chinas" and "guineos," which we found out to be new names for oranges and bananas; the high, massive walls surrounding the ancient city, founded by Ponce de Leon more than a hundred years before the landing of the Pilgrim Fathers.

I can recall now the peculiar sensation I felt as we entered the city through the great gate; how impressed I was with the fortress of San Cristobal; the narrow, paved streets and the cries of the street venders; the ladies with their black mantillas and their attendant maids or chaperons; the politeness of our barefoot negro guide, who "kissed the feet" of every old colored woman we passed; the glimpses of inner courts, or patios, through the doors of the square whitewashed or blue-washed houses; the delicious black coffee and the white unsalted butter at the hotel; the excursion on the little tramway to the suburban village of Rio Piedras, with its clumps of coconuts and bananas; the Spanish soldiers in the streets; the Spanish players at the theater, who sang fascinating "jotas" and danced graceful "boleras;" the no less fascinating islanders in the cafes and dance halls who sang of "la negra Tomasa," or called their sweethearts "caramelitas de miel," and danced the "Borinquen" to music accented by the scraping of corrugated gourds called "güicharas," or "carachos." But I must

refrain: there is not space here to tell of all the novel and interesting features of San Juan, which gave us our first impression of the island and made us realize that we were in a country with customs and etiquette very different from our own.

At the hotel, where I dined with a native Portoriqueño, I heard a discussion of island politics. There seemed, even at that time, to be dissatisfaction with the mother country. I was told that the islanders were overtaxed, the merchants compelled to pay unjust licenses, the lower classes treated like slaves and the better class with disdain. Enormous sums were squandered in keeping the city wall in repair; and nothing had been done toward establishing good roads throughout the island. The cost of the army was enormous. No recruiting among the islanders was permitted, but all soldiers were brought from Spain. The conversation suddenly ceased as a Spanish officer passed our table; but one of the gentlemen added under his breath: "We have the same heart, the same soul as Cuba. Wait! Our time will come some day."

It did come, shortly before my second visit, which was in the summer of 1898. When we landed at the Playa of Ponce we heard how our invading army had been received by the islanders. We had expected resistance; we were met with showers of oranges, bananas, and cigars, and with cries of "vivan los Americanos!" We also heard a pitiful story about the venerable Spanish commander, Colonel San Martin, who found himself deserted by his men and forced to abandon the defense of Ponce. Afterwards we read of his trial and ignominious condemnation by court martial.

At the time of my first visit there was little opportunity for doing any botanical work in the vicinity of San Juan. When we attempted to make an excursion into the interior we found the roads in miserable condition, and our

tough diminutive horses sank to their knees at every step. A visit to the Luquillo Mountains, which had appeared so inviting from the sea, was out of the question, and much of the country that was accessible had an exhausted, worn-out look which was disappointing. We crossed the harbor to Cataño, where we found a characteristic mangrove formation, and we explored a short stretch of the seacoast, outside the harbor, where the strand vegetation proved to be very similar to that of the Florida Keys.

In the market of San Juan there were many tropical fruits and other products which were new to us. In addition to oranges, bananas, and mangos, which were introduced on the island after its discovery, there were also fruits which grew there in prehistoric times, and which are mentioned by Oviedo. Among the latter are pineapples (*Ananassa ananas*), the soursop or guanábana (*Annona muricata*), the sugar apple or anon (*Annona squamosa*), the mamey (*Mammea americana*), the tuna or prickly pear (*Opuntia* sp.), pitahaya (*Cereus triangularis*), jagua (*Genipa americana*), the hobo or hog plum (*Spondias lutea*), caymito (*Chrysophyllum cainito*), and the icaco or beach plum (*Chrysobalanus icaco*). Other pre-Columbian products were the yuca or cassava plant (*Manihot manihot*), from which the aborigines made a kind of bread; mani or peanuts (*Arachis hypogaea*); aji or red peppers (*Capsicum annuum* and *C. frutescens*); maize or Indian corn (*Zea mays*); sweet potatoes (*Ipomoea batatas*), which they called "ajes;" yahutias or Carib cabbage (*Xanthosoma violaceum* and *X. sagittaefolium*), which are aroids with starchy roots, allied to the Polynesian taro; and lerenes (*Calathea allouia*), allied to arrowroot. Among other endemic products were tobacco and annatto (*Bixa orellana*), the latter of which was used by the aboriginal Borinqueños to paint their bodies. Yams (*Dioscorea* spp.) were brought to the

island from Africa at an early date, in all probability as food for the negro slaves, who took the place of the aboriginal Indians exterminated through the persecution by the Spaniards.

Between my first and second visits I added considerable material from various sources to my notes on island vegetation, and I have amplified them since from herbarium material in the National Museum; chiefly from the collections of Mr. George P. Goll, who accompanied Mr. O. F. Cook and Mr. Guy N. Collins, of the U. S. Department of Agriculture, on their expedition to the island in 1899;* as well as from the report of Professor L. M. Underwood, who, together with Mr. Robert F. Griggs, accompanied them on a second visit in 1901.

Before my second visit, in the summer of 1898, a fine military road had been constructed across the island from San Juan to Ponce. I shall never forget my first drive from the Playa, where we landed, on the south coast of the island, to the city of Ponce. On both sides of the road there were lines of magnificent flamboyant trees (*Poinciana regia*) in full bloom. In some countries these are called fire trees; and the name is well chosen, for their spreading crowns seemed fairly ablaze with clusters of orange-red flowers. The city impressed us favorably, with its clean streets, its shady park, and its Spanish-looking houses with their patios filled with ornamental plants. On a neighboring hillside I saw an interesting collection of fruit trees, among them the genepa or quenipa (*Melicocca bijuga*), a tree belonging to the Soapberry family, with pleasantly flavored egg-shaped, pulpy fruits. Another member of this family introduced from Africa is the akee, *Blighia sapida*. Its pearshaped fruit is red on the outside, three-celled within, with glossy black seeds surrounded by a bright yellow

* See Cook, O. F., and Collins, G. N. Economic plants of Porto Rico. Contributions from the U. S. National Herbarium 8: 57–269. 1903.

aril. The latter is the part eaten, either stewed, fried, or baked. On the Isle of Pines it is known as "brain food."

The limestone region to the westward of Ponce is characterized in many places by scrubby vegetation including cactus thickets. There are also several palmettos, including *Inodes causiarum* Cook, from which the natives make hats, and *Thrinax ponceana* Cook, of which this is the type locality. Near the village of Guayanilla there is a veritable cactus forest including columnar and quadrangular forms of *Cereus*, treelike and prostrate opuntias, and the "melon de costa' '(*Melocactus portoricensis.*) Other xerophytic plants of this region are the aromatic *Amyris balsamifera*, species of *Bumelia*, *Forestiera*, *Zamia*, the troublesome burgrass *Cenchrus tribuloides*, and saltbushes belonging to the genera *Atriplex* and *Salicornia*.

The military road across the island rises gradually from Ponce to Juana Diaz. At this village fine specimens of the Porto Rican royal palm (*Roystonea borinquena* Cook) have been planted, together with the corozo palm of the island (*Acrocomia media* Cook). These palms bear a general resemblance to each other from a distance. Both have a columnar, somewhat bulging stem and a crown of pinnate leaves; but the *Roystonea* leaves have sheathing bases, called "yaguas" by the natives, who often use them for covering their houses; and the *Acrocomia* may be recognized by the needlelike prickles with which its stem is armed.*

Between Juana Diaz and Coamo the roadsides are bordered in places by banks of maidenhair (*Adiantum fragile*) and silver fern (*Ceropteris calomelaena*). Near Coamo, at a resort celebrated for its medicinal springs, many beautiful shrubs and climbers have been planted,

* See Cook, O. F. A synopsis of the palms of Puerto Rico. Bull. Torrey Club 28: 526–569. 1901.

including the yellow-flowered *Bignonia unguis;* and in the vicinity grow tamarinds, sapodillas, and other fruits together with the starch-yielding marunguey (*Zamia media*). Near the margins of the springs grow the "culantrillos del pozo," *Adiantum capillus-veneris* and *A. tenerum;* in the neighboring swamp *Acrostichum aureum*, so often found in marshes near the sea; and in the water of ditches, *Ceratopteris deltoidea*.

Beyond Coamo the road dips down into a deep valley and crosses a little river by a well constructed bridge. It then begins to climb toward the mountain pass of Aibonito, the point where the Spaniards took their stand to resist the American invasion. Magnificent views present themselves one after the other as the road winds about a labyrinth of mountain ridges, with the beautiful blue Caribbean Sea to the southward. Then, after passing beneath a lofty cliff, the mountain pass is reached and beyond it the village of Aibonito.

Approaching Cayey, farther on, there occurs a perceptible change in the temperature, owing to the cool moisture-laden breeze which almost continuously sweeps the crests of the hills. This is the main tobacco center of the island. Beautiful tree ferns, *Cyathea arborea*, and dense groves of mountain palms (*Acrista monticola*) make their appearance, together with trees of the genera *Tecoma* and *Tabebuia*, of the Bignonia family, called robles; and a rubiaceous shrub (*Hamelia patens*) called balsamo, with orange-red flowers. Among the ferns of this vicinity are *Dennstaedtia adiantoides, Asplenium dentatum, Polypodium aureum*, and the pretty golden fern, *Ceropteris sulphurea*. From Cayey a branch road leads to Guayama, on the southeast coast of the island, most of the way along a mountain ridge, where there are groves of mountain palms, clumps of tree ferns, rank-growing Heliconias, and among them such ferns as *Polypodium crassifolium* and *Hemionitis palmata*, associated with succulent aroids,

Melastomas and Piperaceae. At Guayama there are sugar plantations and many useful plants, including a triangular cactus (*Cereus*), which climbs over walls and bushes and bears edible pitahayas, as large as goose eggs.

Returning to Cayey, the road proceeds northward toward Caguas, shaded in places by trees clothed with epiphytal ferns, and passing numerous clumps of tree ferns, *Cyathea arborea*. At the village of Beatriz occurs an interesting prickly-stemmed climbing fern, *Odontosoria dumosa*. The village of Caguas is composed of houses resembling the aboriginal dwellings of Porto Rico, thatched with palm leaves, and the sides of many of them covered with yaguas or the bases of leaves from the royal palm. Breadfruit trees and taro (*Colocasia esculenta*), here called "yautia malanga," give it a Polynesian aspect. To the westward of Caguas, near Aguas Buenas, are some interesting caves, the openings to which are curtained with tapestry of ferns.

Between Caguas and Rio Piedras, the road is bordered in places with *Cyclopeltis semicordata* and *Asplenium dentatum*, and shortly before reaching Rio Piedras there is a beautiful shady bank covered with *Blechnum occidentale*, associated with succulent Piperaceae, and 3-ribbed Melastomaceae. (See PLATE 3.) At Rio Piedras, formerly the suburban residence of the Spanish governors of Porto Rico, there are many introduced ornamental shrubs and trees.

I have already referred to the mangrove formation at Cataño, across the harbor from San Juan. Here with the mangroves grow the alligator apple (*Annona glabra*), the seaside grape (*Coccolobis uvifera*), and the swamp ferns *Acrostichum aureum* and *Blechnum serrulatum*.

Not far from Cataño, and connected with it by a diminutive narrow-gauge road across the marshes, is the town of Bayamon, now the center of an important orange and grapefruit industry, a very fertile region where

BLECHNUM OCCIDENTALE, MELASTOMACEAE PIPERACEAE, etc.
Roadside bank between Rio Piedras and Caguas
Photograph by Guy N. Collins

tropical fruits of all kinds grow luxuriantly. This place is the home of Dr. Augustin Stahl, the eminent botanist and archeologist of the island, and his accomplished daughter. For some distance to the westward the rich soil continues, offering an inviting field for American enterprise, especially for the cultivation of citrus fruits.

On proceeding along the north coast toward Arecibo, palms of several species are encountered. Near the shore, there are stretches of sand and occasional saline ponds surrounded by desertlike vegetation. Farther inland a series of domelike hills can be seen, which at one time were probably coral islands. These are covered with forest trees, and above the general level of vegetation the crests of palms (*Aeria attenuata* Cook), which from a distance appear to be floating in the air; for their trunks are so slender as to be invisible. This part of the coast recalls the eastern extremity of the island of Cuba, where similar palms can be seen from the sea.

At Arecibo occurs another palm (*Thrincoma alta* Cook) with a remarkably tall and slender trunk, and in the immediate vicinity extensive fields of sugar cane may be seen. From Arecibo a road leads southward to Utuado, offering a succession of magnificent views, as it follows the winding valley of the Rio Grande.* First a limestone region is encountered and the road passes beneath high cliffs crowned with endemic fan palms; then a metamorphic region, where the character of the vegetation changes abruptly; then coffee plantations make their appearance, for this part of the island is the principal center of the coffee industry.

Higher up appear beautiful tree ferns, *Hemitelia horrida*, with short spiny trunks, and *Cyathea arborea*, with trunks sometimes 25 to 30 feet high. This portion of the island offers a most inviting field to the botanist.

* See Underwood, Lucien M. Report on a trip to Porto Rico. Journ. N. Y. Bot. Garden 2: 166–173. 1901.

Many of the coffee plantations are reached only by mountain trails across ridges and ravines, which yield a rich and varied harvest. At Isolina, westward from Ciales, there is an area of primeval forest, including magnificent specimens of tabanuco trees (*Dacryodes excelsa*), the straight smooth white trunks of which sometimes rise to a height of more than a hundred feet.

Near Utuado the slopes are more or less deforested, but there are beautiful clumps of royal palms (*Roystonea borinquena*) which add grace to the landscape, and in the ravines there are rank growths of ferns, aroids, Piperaceae, and Melastomaceae. Higher up there are groves of mountain palms (*Acrista monticola*), and the limbs and trunks of the hardwood trees are clothed with filmy ferns (*Trichomanes*), *Elaphoglossum*, and epiphytal polypodies. The road from Utuado to Adjuntas, which has been completed since the American occupation, is no less picturesque than that to the northward, with the slopes of the mountains dotted here and there with clumps of Roystoneas and corozo palms (*Acrocomia media*). In the vicinity of Adjuntas there are several wooded mountain peaks with their trees covered with epiphytal ferns. From Adjuntas to Ponce the road passes through coffee plantations, shaded with bananas or introduced Ingas and Erythrinas.* Farther on, the vegetation becomes more xerophytic. The royal palms are replaced by palmettos, and the forest ferns by species of *Notholaena* and *Cheilanthes;* and Cactaceae, Zamias, and scrubby bushes cover the rocky limestone formation.

Along the west coast, which is much drier than the north coast, there are several fine groves of mangos, especially in the vicinity of Cabo Rojo.† At the inter-

*See Cook, O. F. Shade in coffee culture. U. S. Dept. Agr. Bot. Bull. 25; Agriculture in the tropical islands of the United States. Yearbook U. S. Dept. Agr. 1901: 358. *pl. 43*. 1902.

†See Collins, Guy N. The mango in Porto Rico. U. S. Dept. Agr. Plant Ind. Bull. 28: *pl. 1*. 1903.

esting old town of Mayagüez an Agricultural Experiment Station has been established. Considerable sugar is produced in this vicinity, as well as excellent pineapples; and this is the principal center of the hat-making industry, on account of the groves of palmettos (*Inodes causarum*) which grow here spontaneously. The well known *Carludovica palmata*, from which the so-called Panama hats are made, has been introduced in this region together with many other useful plants. Aguadilla, a port near the northwest corner of the island is connected by roads with coffee plantations in the interior, the most important of which are about San Sebastian; and near Isabel on the north coast, pomelos or grapefruits, said to be the most delicious in the world, are now produced and sent in quantities to foreign markets.

But the forests of the Luquillo Mountains, at the opposite extremity of the north coast of the island, are more interesting to the botanist, and are so important from the conservationist's point of view that they have been made a forest reserve.* Here, between the altitudes of 500 and 2,000 feet occur four of the most important timber trees of the island: the tabanuco, laurel sabino, ausubo, and guaraguao. Of the tabanuco (*Dacryodes excelsa*) I have already spoken in connection with the forest of Isolina. When scarred, its trunk yields an aromatic resin, sometimes called "mountain incense" in the West Indies. The beautiful laurel sabino (*Magnolia splendens*), which yields a handsome hard wood, is called laurel on account of its aromatic properties. The ausubo is a species of *Mimusops* (*M. nitida*), belonging to the sapota family; and the guaraguao (*Guarea trichilioides*), belonging to the mahogany family, is a relative of the Spanish cedar, of which cigar boxes are made. Trees of less importance are the palo colorado, or cedro macho

* See Gifford, John C. The Luquillo Forest Reserve, Porto Rico. U. S. Dept. Agr. Forest Bull. 54. 1905.

(*Hufelandia pendula*), a true laurel; and the leguminous "moca" (*Andira jamaicensis*) with purplish papilionaceous flowers and rounded or elliptical, one-seeded pods, which are much relished by bats. Among the lianas are species of *Philodendron* and *Anthurium*, belonging to the arum family; a wild yam (*Rajania Sintenisii*), and the "bejuco de palma" (*Marcgravia Sintenisii*). There are also succulent Begonias with pink flowers (*B. portoricensis*); Realnemias, allied to the gingers and Alpinas; and a number of Melastomaceae and Piperaceae. One of the most disagreeable features of the region is the occurrence of cutting sedges called cortadero, or razor grass (*Scleria* spp.).*

Above the elevation of 2,000 feet the timber is for the most part stunted and gnarled and clothed with mosses, lycopods, and epiphytal ferns. From the summit of El Yunque, elevated about 3,500 feet above the sealevel, the interior basin appears like a sea of palm crests (*Acrista monticola*), with occasional islands of dark-leaved timber trees.

Among the epiphytal ferns are several species of *Trichomanes*, including the exquisite *T. membranaceum; Hymenophyllum polyanthum* and *H. lineare; Elaphoglossum apodum; Rhipidopteris peltata;* the bird's nest fern (*Asplenium serratum*); *Ophioglossum palmatum;* and several species of *Polypodium*, including *P. serrulatum* and *P. trifurcatum*. Other ferns are *Tectaria plantaginea, T. trifoliata, Dryopteris radicans, Asplenium cuneatum, Adiantum obliquum, A. denticulatum, Polypodium aureum, Danaea nodosa*, and in open places on the mountain slopes *Dicranopteris bifida*. On the margin of a cascade which plunges down the steep slope of Mt. Jimenez, are soft curtains of *Adiantum*, banks of *Dryopteris, Antrophyum*, and *Ceropteris*, and the interesting

* See Wilson, Percy. Report on a trip to Porto Rico. Journ. N. Y. Bot. Gard. 3: 178, 179. 1902.

Fadyenia prolifera, the fronds of which take root at their tips like our own walking fern.*

But the crowning glory of the Pteridophytes are the tree ferns. Nothing more graceful can be imagined than *Cyathea arborea*, with its slender trunk, its young fronds uncurling at the tips like bishops' crooks, and its lacelike pinnae silhouetted against the sky. The accompanying illustration (PLATE 2, frontispiece), reproduced from a photograph in Dr. John C. Gifford's report on the Luquillo Forest Reserve, will serve to show its beauty better than any possible description. Other tree ferns of these mountains are *Cyathea portoricensis*, the prickly-stemmed *Hemitelia horrida*, and at least two species of *Alsophila*.

I have neglected to mention the caves which occur in various localities on the island. Some of them furnish a supply of bat guano, which has been found to be highly beneficial in fertilizing worn-out sugar fields and other areas exhausted by centuries of cultivation. In these caves various articles of archeological interest have been found. But there is not space here to speak of the vestiges of the aboriginal inhabitants of Porto Rico, some of which, especially objects of stone in the shape of horse collars and peculiar three-pointed stones, are to be classed among the enigmas of archeology.†

As I think of the beautiful island with its tree-clad hills, its picturesque valleys, and smiling fields of sugar cane, I rejoice that it is ours. It is to be hoped that the natives will realize the advantages we have brought them. We have facilitated the means of transportation by constructing roads and railways which will enable them to bring their produce to market; we have created a forest reserve and have taken steps to reclaim extensive denuded areas; we have established an island agricultural

* See Urban, Ignatius. Symb. Ant. 4. 1903–1911.

† See Fewkes, J. Walter. The aborigines of Porto Rico and neighboring islands. Annual Rep. Bur. Am. Ethnology 25. 1907.

station and have introduced many useful plants and trees; and we have established schools for the benefit of rich and poor, and have given the citizens a voice in their own government. Complaints sometimes reach the papers, which point to discontent among the islanders; but these may often be traced to disappointed politicians seeking public office, or to taxpayers who expected all taxation to cease after the American occupation of the island. They now ask for the privilege of United States citizenship or autonomy. It remains for us to convince them that we have the real interests of all the islanders at heart, and that every official act is for the lasting benefit of Porto Rico.

Lycopodium selago from Ohio

LEWIS S. HOPKINS

A short collecting trip was made to Dundee, Tuscarawas Co., Ohio, in the early part of August 1911. While examining the sandstone rocks for *Lycopodium porophilum* Lloyd & Und., which grows here rather plentifully, a plant was found that differs very materially from the typical *L. porophilum*. In fact it was the difference between the two plants which were growing in close proximity to each other that first attracted my attention.

Quite a quantity of the plant was secured, some of which was put in press at once and a part kept green for careful study at a later time. A critical examination of this material shows the plant to have the following characteristics:

Stems rigidly erect, 3–14 cm. high, underground portion very short, with a profusion of roots which form a tangled mass; leaves in more or less irregular zones, yellowish green in color, acuminate or attenuate, hollow at the base; lower leaves, when wilting or drying in press, reflexed; leaves in middle portion of stem spreading;

upper leaves decidedly appressed; foliage leaves from middle portion of stem 7.5–8.5×1.5 mm., entire or very slightly denticulate, middle portion of leaf only very slightly if at all wider than the base; foliage leaves from upper part of stem 4–5×1 mm., entire, and tapering uniformly to the base; sporophylls 4.5–5.2×1–1.3 mm., entire, acuminate, triangular; sporangia reniform and almost hidden by leaves; profusely gemmiparous.

On sandstone rocks at an altitude of about 350 meters.

For the purpose of comparison Lloyd and Underwood's description* of *Lycopodium selago* L. is given:

"Prostrate portion of stem very short, abundantly rooting, soon curving upward and dichotomously branching to form compact tufts (4–17 cm. high.) of vertically placed branches with dense foliage: leaves more or less appressed, or at least upwardly directed, triangular (1.5×4 mm.) to linear-acuminate (0.5 mm.×5 mm.) or aciculate (1 mm.×8 mm.), broadest at the hollow base, gradually tapering to the acuminate apex, entire: sporophylls shorter than the leaves, triangular: sporangia reniform; plant very frequently gemmiparous."

It will be seen, then, by comparison that this plant possesses the three most marked characteristics of *L. selago*, viz, hollow leaves, a mass of roots, and abundant gemmae. To one who sees the plant growing, or collects it for the first time, the abundant gemmae alone, or the mass of tangled roots, will be sufficient to separate it from related species.

Unfortunately the gemmae fall off in drying and it is exceedingly difficult to preserve the roots, so that neither shows its relative value in the accompanying illustration. This was made from a pressed specimen collected Aug. 9, 1911, and now in my herbarium. The illustration fails to show the upright erect habit of the plant, as the stems have been bent out of their proper position to prevent overlapping.

* Bull. Torrey Club. 27: 149. 1900.

LYCOPODIUM FROM DUNDEE, OHIO
From photograph of herbarium specimen

On account of its intermediate character this plant might be supposed to be a hybrid. Or, it might be considered sufficiently distinct to be described as a new species. However, although it is not typical *Lycopodium selago* L., it is here included in that widely distributed and very variable species, according to the present classification of the genus.

Lloyd and Underwood* give the distribution of *L. selago* as follows: "Greenland, Labrador, Newfoundland, Maine, New Hampshire, Vermont, New York, North Carolina, Idaho, Washington, Alaska, St. George Island (Behring Sea). A plant with strongly reflexed leaves but not otherwise differing from *L. Selago* is represented by specimens as follows:

"IDAHO: Little North Fork Basin . . . . . .

"ALASKA: Sitka . . . . . .

"CANADA: Mud Lake . . . . . ."

It occurs also in Pennsylvania as Poyser† says of it: "Rare. Top of a mountain at the Delaware Water Gap in Monroe County. The only record."

PEABODY HIGH SCHOOL,
PITTSBURGH, PA.

Observations on some Lycopodiums of Hartland, Vt.

NANCY DARLING

On Sept. 30, 1908, the author found, near one of the Eshqua Bogs, Hartland, Vt., a thriving ring of *Lycopodium sabinaefolium* Willd., growing in the vicinity of young pines in pasture land, and a few rods away from it a wide strip of the blue-green club moss, *L. tristachyum* Pursh. About a year later the two species were dis-

* Loc. cit. 150.
† Poyser, W. A. Fern Bull. 17: 80. Jl 1909.

covered growing together in a spot close to the bog, where numerous hummocks displayed the qualities of the plants to great advantage. Here the ring of *L. sabinaefolium* was probably forty feet in diameter and could be easily distinguished by its leaves, which give it the look of a trailing cedar. Reindeer moss, Polytrichums, and Hypnums were mingled with the club mosses, all being in the partial shade of scattered young maples. In this region *L. tristachyum* is very dense in growth, especially where it is in the open. Its funnel-shaped fans are so heavy as to feel almost leaden in the hand; its color is a deep, glaucous blue-green, and its tiny leaves are so closely appressed as to give the branchlets the appearance of being smooth, or lacking the awl-shaped tips; while, in fruiting, it is prolific, five, six, seven, or eight spikes on one peduncle being not unusual.

On July 19, 1910, Mrs. A. B. Morgan and the author, while driving to a nature club meeting at "Fairview," N. Hartland, found a very different form of *L. tristachyum*. The sterile branches of this plant, instead of being funnel-shaped were almost globular, some of them over 14 cm. across, and the branchlets were very narrow, about 1 mm. in width, if leaf tips are excepted. The leaf tips, however, were in some of the branches noticeably spreading, and branches showing this characteristic were looser than the others and tended to form delicate sprays resembling vines. The soil in which this form grows is clay.

Aug. 31, 1910, Mr. P. W. Whiting collected a similar form, in fruit, on Hart Island. All the fertile branches were loose and vinelike, and their peduncles bore two, three, and four spikes, respectively; but some of the branchlets were at least 0.5 mm. wider than those noticed on the N. Hartland plants. The soil of Hart Island is sandy.

Aug. 12, 1911, Mr. J. G. Underwood collected in Spruce

Swamp, on a rocky hill, specimens of a *Lycopodium* whose peduncles bore two, three, and four spikes, similar to those of the Hart Island plants, but whose branches resembled those of *L. complanatum* L. The branchlets were broad and flat, as in the latter species; but the leaf tips were far more spreading, even bristling.

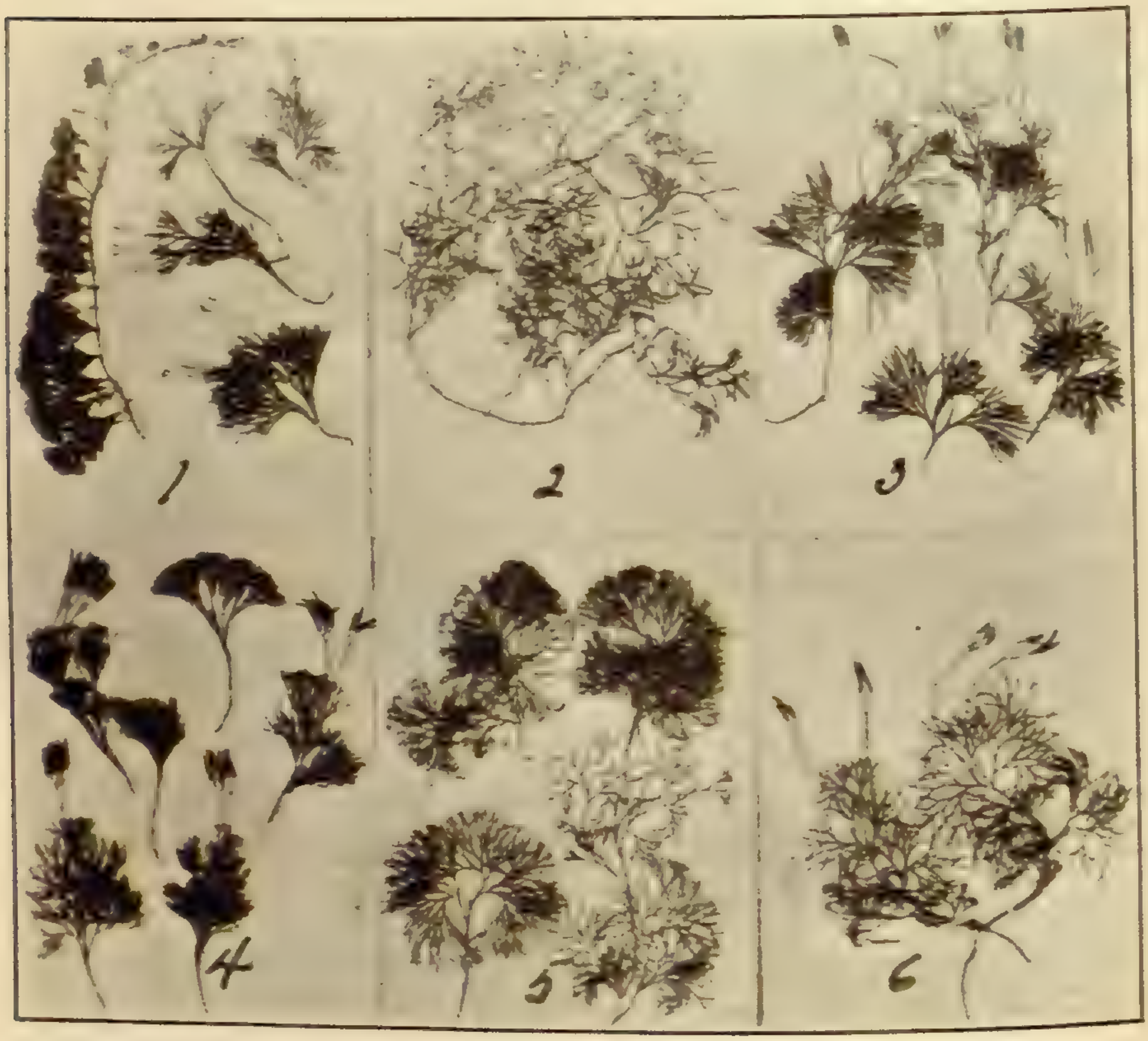
Dr. Ezra Brainerd, of Middlebury, Vt., in 1910, expressed his observation of the apparent mingling of *L. tristachyum* and *L. complanatum* characteristics in specimens from N. Hartland and Hart Island. In the Spruce Swamp form, the crossing of these two species is even more strongly suggested. The soil of Spruce Swamp is, in places, a dry loam, somewhat like that of the Eshqua Bog's outer limits, where the rocks are Conway schists.

Now, the question is, Does *Lycopodium complanatum* L. grow in Hartland? If so, it might cross with *L. tristachyum* Pursh. Mr. W. H. Blanchard has described, in Rhodora for October 1911, a station of it, true to the type, which was discovered May 7, 1910, by Mr. H. G. Rugg, in the Lull Brook valley, near Hartland village. The plants here produce branches that are gracefully diffuse and which are composed of few branchlets. The peduncles bear only one fertile spike each. June 4, 1910, at the base of Garvin Hill, which is over 1800 feet high, the Hartland Nature Club observed another form of *L. complanatum*, some of whose sterile branches are compactly funnelshaped and whose fertile branches resemble those of the Hartland village station. The Garvin Hill plants have peduncles bearing one, two, and three fruiting spikes. Another feature is that the general growth of the running stems takes the form of a ring, as in the case of *L. sabinaefolium*.

Lycopodium tristachyum, then, in Hartland, might cross with *L. complanatum* to produce a hybrid; and as the anomalous forms of *L. tristachyum*, above described, renew their growth from the ends of all the branchlets,

just as in the true *L. tristachyum*, but have the divergent leaf tips of *L. complanatum*, it is possible that they are hybrids of these two species.

Lycopodium complanatum L. var. *flabelliforme* Fernald being very abundant in every part of the town, the crossing may be with that rather than with the type.



LYCOPODIUM

FIG. 1. *L. complanatum* L., from Garvin Hill.
2. *L. complanatum* L., from Hartland village.
3. *L. complanatum flabelliforme* Fernald, from Jenneville.
4. *L. tristachyum* Pursh, from Eshqua Bog.
5. *L. tristachyum* Pursh, from North Hartland.
6. *L. tristachyum* Pursh, from Hart Island.

Indeed, the variety *flabelliforme* varies exceedingly in this section. For instance, in Jenneville, there is a spot, by a branch of Lull Brook, where large plants of it,

Yours sincerely
Carl Christensen.
Feb. 1911.

growing under maples and young hemlocks, yield peduncles that support one, two, three, four, five, and six spikes, all aberrant, in that each spike is lengthened into an awllike tip of leaves.

On the crest of Sunset Ridge, "Appledore," is a station where the plants show the same characteristics in fruiting, in addition to having the trailing stems form a distinct ring. In the latter place, there are hummocks lying open to the sun, over which some of the *Lycopodium* runs.

Fern students in Hartland invite special observation of these forms on the part of any and all interested in plant morphology and ecology. Specimens of the different lycopodiums mentioned in this article have been placed in the herbarium of the Hartland Nature Club, and photographs of them have been taken by Mrs. Evaline Darling Morgan.

WOODSTOCK, VT.

Carl Frederik Albert Christensen: some biographical notes

R. C. BENEDICT

(WITH PORTRAIT)

Some years ago, in the winter of 1894–1895, a young Danish student who was preparing to take his master's degree in botany at the University of Copenhagen, had occasion, in order to complete his course requirements, to select and develop a topic relating to some special group of plants. The student, Mr. Christensen, chose to study ferns. From that beginning he has continued his work with these plants until, at the present time, he may well be considered the leading active student of ferns.

His Index Filicum is undoubtedly the most useful

fern book ever issued. With its 744 pages, including 23,499 specific names, it bears about the same relation to fern study that a dictionary bears to the study of a foreign language. Since this much needed task was completed, Mr. Christensen has published a number of important monographic papers dealing especially with the genus *Dryopteris*. Three of his shorter papers have appeared in the AMERICAN FERN JOURNAL, and it is with a view of making readers of the JOURNAL better acquainted with Mr. Christensen that the present article is written.

Carl Frederik Albert Christensen was born in a village on the island of Lolland in South Denmark on the 16th of January 1872. His early education was obtained in the elementary and higher schools of the island of Falster. In 1888 he went to a secondary school in Copenhagen to prepare for the entrance "examen" of the University of Copenhagen, which he entered in 1891. Here, for the first year he studied with the intention of following medicine as a profession, but after this he decided to specialize in natural science, particularly botany, which had long been a favorite pursuit of his. His teacher in this subject was Prof. Eugenius Warming. Beside botany, he studied also physics, chemistry, zoology, mineralogy, and geology In 1900 he received the degree of Master of Science from the university. Since then he has worked in the library and museum of the university, and has taught in the secondary schools. The botanical library there is particularly rich in old literature, which was especially necessary during his preparation of the Index.

In October 1900 he was married to Miss Aff Derschen. Since then three daughters have been born.

The selection of ferns for his special study was in Mr. Christensen's case entirely accidental, and yet his choice had in it the same elements that have led most members of the American Fern Society to be interested in these

plants. As already noted, he had occasion in the winter of 1894–1895, to choose some group of plants as a "speciale," i. e., one which he had to study so thoroughly that he could be said to know it perfectly. At that time he was engaged in collecting in the field, winter stages of the wild plants of his country. On one excursion, on a cold winter day when the ground was white with snow, he came into a beech forest where he found in the snow some fern leaves which were still quite fresh and green, offering a beautiful contrast to the white snow. He knew at that time scarcely more than a dozen fern species, and the beautiful leaves which he had found seemed entirely unknown to him. He preserved some of the leaves and as he later tried to identify them, he was struck with their beauty: in their beautiful outline and delicate structure, they seemed to him esthetically far to surpass all other plants. He was seized by a veritable *amor sancta* for them, and from that moment his "speciale" was chosen. The particular fern found that day was believed then to be the reputed hybrid *Dryopteris cristata* × *spinulosa*, sometimes identified with the American *D. Boottii* (Tuck.) Underw., but it was probably a form of the true *spinulosa*. It may be noted that here in America reputed crosses between the more evergreen species and those that are less so are usually intermediate in this respect as well as in the other characters of difference between the species.

In preparing these notes, I was interested to learn how Mr. Christensen came to publish his scientific contributions in English. The text of the recent articles in the JOURNAL appeared almost exactly as written, only a few minor changes having been made in the phraseology. Below I quote in very slightly modified form his reply to my request for information.

"We small nations are of course compelled to communicate in a foreign language, as very few foreigners under-

stand Danish. In the higher schools, English together with German, French, and Latin are taught, but at my time English was read only, not written or spoken as in the present secondary schools. As a young student I could read English but scarcely write anything correctly. During my botanical studies, I was compelled almost daily to read English scientific literature, and *peu à peu* I learned the usual combinations, scientific words, etc. I have thus taught myself to write English. . . . Beginning a correspondence with foreign botanists, I tried to write partly in German and partly in English. German is easy for us Danes to speak but very difficult to write correctly because of its difficult grammar. English, on the other hand, difficult for us to speak because of its pronunciation, is far the easiest language for us to write, because its grammar is like our own, very simple, and the position of the words is very like that of Danish. I have therefore chosen English as my language of correspondence, and I now write all my letters, even to Germans, in English. I know very well that my English is bad, but I know also that I can express my thoughts in that language so concisely that I rarely fear to be misunderstood."

Certainly readers of Mr. Christensen's recent papers in the JOURNAL will be ready to affirm the truth of the last statement in the preceding sentence, and we shall all hope to read more of his articles in future numbers of the JOURNAL.

I include below a list of his contributions to fern literature. I am not sure that it is complete, but I believe it is practically so. It is interesting to note that all of the papers deal at least in part with American ferns. The papers are listed in chronological order.

1. New ferns from Brazil. Bot. Tidsskr. **25**: 77–81. 27 D 1902.

2. On the American species of *Leptochilus*, sect. *Bolbitis*. Bot. Tidsskr. **26:** 283–297. *f. 1-8.* 30 N 1904.
3. A new *Elaphoglossum* from Brazil. Bot. Tidsskr. **26:** 299, 300. 30 N 1904.
4. Index Filicum i–lx+1–744. 1905.
5. Revision of the American species of *Dryopteris* of the group of *D. opposita*. 1–90. 1907. (Kgl. Danske Vidensk. Selsk. Skrifter VII. **4:** 247–336.)
6. *Dryopteris* nova brasiliensis. Repert. Sp. Nov. **6:** 380, 381. 1 Mr 1909.
7. On *Stigmatopteris* a new genus of ferns with a review of its species. Bot. Tidsskr. **29:** 291–304. *f. 1-15.* 25 My 1909.
8. The American ferns of the group *Dryopteris opposita* contained in the U. S. National Museum. Smithson. Misc. Coll. **32:** 365–396. 12 Jl 1909.
9. Ueber einige Farne in O. Swartz' Herbarium. Arkiv Bot. **9**[11]**:** 1–46. *pl. 1-5. f. 1-13.* 22 F 1910.
10. On some species of ferns collected by Dr. Carl Skottsberg in temperate South America. Arkiv Bot. **10**[2]**:** 1–32. *pl. 1. f. 1-4.* 9 S 1910.
11. On the genus *Dryopteris*. Am. Fern Jour. **1:** 33–37. 13 F 1911.
12. The *Pteridophyta* of the arctic regions. Am. Fern Jour. **1:** 65–70. 3 My 1911.
13. Four new ferns. Repert. Sp. Nov. **9:** 370–372. 10 Je 1911.
14. The tropical American species of *Dryopteris* subgenus *Eudryopteris*. Am. Fern Jour. **1:** 93–97. 7 Au 1911.
15. On a natural classification of the species of *Dryopteris*. Biol. Arbejder Tilegnede E. Warming 73–85. 3 N 1911.

NEW YORK CITY.

Letter to the members of the American Fern Society

ROBERT A. WARE

It is probable that among the first questions that come to the mind of one who finds himself the nominal head of any organization, are those which pertain to the larger usefulness and greater efficiency of that organization. Since a turn in the wheel of fortune has brought me into this new relation with this society, I have been asking myself what can be done to make it more interesting, more profitable, more worth while. Without expecting too much, and yet with a desire to stimulate if I may, the fruitful energies of our society, I venture to offer several suggestions pointing to that desired end.

I believe that it is proper that we should ask ourselves these two questions, viz: What may I expect to gain from the society? What can I do to make the society more interesting and more profitable to all members? The thoughtful consideration of these questions will in itself, I believe, contribute toward realizing the purposes for which the society was organized. And from the beginning it is well to recognize that the society will be what we make it, nothing more, and that much depends upon our answer to the last of these two questions.

Now what are our resources? We have an organization of about 250 members, scattered over the United States and elsewhere, having a common interest and who, it may be assumed, have become members with the belief that something was to be gained thereby. Our membership includes men and women of various attainments, from those who are making botanical science their profession to those whose satisfaction is found in beholding with glad and satisfied eyes the glory and the beauty of the living plant in its natural habitat.

We have a society "Journal" splendidly edited, well

printed, creditable in every way, and in which we can all take pride.

We have a society herbarium, instituted through the initiative of the late Alvah A. Eaton and recently, by the commendable efforts of our present energetic curator, put into more available shape for use, from which any member may, by paying the cost of transportation, borrow authoritatively named specimens with which to compare his own.

Finally we have the postal service, making communication easy.

Here, then, are resources at hand sufficient to bring to us individually far more than most of us are at present realizing.

I am disposed to believe that our members generally would welcome a larger intercourse. While no doubt there are those who are so occupied with their professional duties that they would find it difficult to take on additional correspondence, there are, I am convinced, many of our members who would gladly find time in which to satisfy any genuine appeal for help or advice. But it is not the advanced student alone to whom we may look for increased activity. Surely we all know the value of comparing notes with those whose studies and observations, although along similar lines, have yet been different from our own. Such exchange of experiences is both interesting and stimulating. Then, too, most of us enjoy having questions put to us, not that we always answer them offhand, but because we want to answer them, because they set us to thinking and to investigating, and because they give us a keener relish for the subject itself. And then there is always coming into the field a new generation of beginners with their refreshing enthusiasm and eager inquisitiveness, one of the best things in our society. These should be made to feel that they are welcomed into a fellowship whose spirit

is one of helpfulness. They should be made to feel, also, that fern students, whether advanced or beginners, need no special introduction to each other, but that our common membership may be counted as sufficient ground for approach, and that any hesitation lest our advances shall not be looked upon with cordiality should be put aside. I would therefore urge those who are not already doing so, to write some of their fellow members, write if only to ask a question and then follow where that step shall lead.

It is to be hoped that, with all proper regard for the preservation of the wild plants, you are forming an herbarium. This contributes to one's cumulative knowledge and serves as a valuable record of what he has accomplished and as a basis for further study. Here again is a channel through which you can work to your own and others' advantage. Offer the plants of your region, or any surplus you may have from elsewhere, to another, in exchange for those he may be able to send you. We are sometimes inclined to say that only the common species grow in our neighborhood and that no one wants them. Perhaps we need to be reminded that the "common" species of one region may be uncommon or rare or even entirely absent in another region. Moreover, one who aspires to a broad outlook over the fern world is not satisfied with the fact that the several species are represented in his herbarium; he aims to show their range, together with variation due to soil, climate, local environment, and other conditions, and therefore wants examples of the species from many different regions. Occasionally we learn of one who is making a special study of a single genus or species. Such a student finds it necessary to examine a great many plants of that group, and you can help him by sending him material. So I repeat: write, put your questions, offer your duplicate plants; and if your experience proves to be anything like mine, you will get help and a lot more besides.

As to the JOURNAL, although we have an able editor we should not let him carry the burden alone. It is safe to say that he welcomes contributions not only of a technical, somewhat ponderous character, but others as well in lighter vein, short, pointed, crisp notes, and the simple reports of observations in the field or elsewhere. Such as these we all enjoy, for they give life and zest to a periodical and are much to be desired. The things that have interested you are likely to interest others, and one need not be a skillful writer to tell of the things which have interested him, nor should he wait for the time when he may write a fine "article." We want the variety which results from many contributors. Furthermore, this society, because of its widely scattered membership, lacks an advantage possessed by many organizations, in that it is unable to get its members together in any considerable numbers for acquaintance and discussion. This emphasizes the desirability both of making more use of the JOURNAL as a medium of interchange, and of the development of individual correspondence. I wish that we might have a discussion of these very points in the pages of the JOURNAL. Send in your questions to the editor. He will answer them, and he may find some of them of sufficient general interest to warrant their publication, together with his answers or comments. Here is a way in which both expert and novice can help.

It should not be forgotten that the society herbarium will be increased in value to the extent that it is made to contain the various species in large numbers. Here is another way in which you can help, by sending ample material, even of the common species from your region. When you are collecting for yourself have the society herbarium in mind and collect for that also. Send the plants to the curator, who will welcome and acknowledge them. If it is convenient for you to send them well

mounted on standard herbarium sheets it will be so much more a help, but that is not necessary. And if you cannot send many, send a few.

Finally, you can help by giving to the officers your criticisms and your suggestions for making the society more helpful. Therefore, do not hesitate to express your sentiments.

By the foregoing it will be seen that I am more inclined to suggest ways in which one can contribute to the general good than direct ways in which he can secure benefits. The truth is, I believe the second is more than likely to be wrapped up in the first, and that he who is disposed to consider ways in which he can be useful will soon find himself gaining as much as, if not more than, he is giving. This is probably no less true in this matter than in most affairs of life.

It will be very gratifying to note an increased utilization of the excellent resources we have at our command. I hope that there are those who will be stimulated to greater activity through some suggestion found herein, and that all of us will experience more satisfaction than can possibly come from simply seeing our names on the list of members and in paying our annual dues.

BOSTON, MASS.

Some hybrid ferns in Connecticut

E. J. WINSLOW

During the past three years I have received from Mr. H. C. Bigelow, of New Britain, Conn., several packages of ferns collected by him in central Connecticut, including many hybrids of *Dryopteris*. A brief, generalized record of these follows:*

Dryopteris Clintoniana × *Goldiana* Dowell. Plainville, 1909. [Nov. 1, 1911.]

D. Clintoniana × *intermedia* Dowell. Several collections, Plainville and Southington.

[*D. Clintoniana* × *spinulosa* Benedict. Southington, July 1911; Plainvllle, Nov. 1, 1911.]

D. cristata × *Goldiana* Benedict, Plainville, July 1909.

D. cristata × *marginalis* Davenp. Several collections from New Britain, Berlin, Bristol, Cromwell, Manchester, and Plainville. This hybrid was found to be surprisingly common in a piece of woods near Windsor by the Fern Society members who attended the Hartford meeting last June.

D. cristata × *spinulosa* (Milde) C. Chr. Plainville, July 1909. [Southington, July 1911.]

D. intermedia × *marginalis* Benedict. A fine, well fruited, and very convincing specimen, Manchester, September 1911.

There are collections of *D. cristata* × *intermedia* Dowell (*D. Boottii*) from all these localities.

In July 1910 I found one good plant of the rare hybrid *D. Goldiana* × *intermedia* Dowell at the edge of the town of Irasburgh, Vt., near the village of Orleans.

AUBURNDALE, MASS.

* [Some additions, in brackets, have been made by the editor, to whom Mr. Bigelow has submitted a number of specimens for identification or verification.—PH.D.]

Notes and news

Mr. H. E. Ransier of Manlius, N. Y., has made a set of twenty-nine excellent stereographs of ferns. The set has been passed along to several members, and those wishing to examine the pictures should communicate directly with Mr. Ransier.

The annual winter meeting of the Vermont Botanical Club was held at Dartmouth College, Hanover, N. H., March 29-30. Thirty members were in attendance, among whom were several members of the American Fern Society, as follows: Dr. Ezra Brainard, president of the club, Mrs. Nellie F. Flynn, Miss Nancy Darling, Miss Mabel Strong, Mr. J. G. Underwood, and Mr. Harold G. Rugg. Several short botanical papers were given and Prof. M. L. Fernald of the Gray Herbanium, Harvard University, gave a most interesting illustrated lecture on Some Red Letter Days on the Newfoundland Barrens. Two papers on ferns were given: The Measles Fern, by Mr. E. C. Kent; and Vermont, the Fern-Lover's Paradise, by Mr. Rugg.

New members and subscribers:

Amherst College Library, Amherst, Mass.
Atwood, Dr. Charles, Moravia, N. Y.
Boston Society of Natural History, Boston, Mass.
Bragg, Miss Laura M., Charleston Museum, Charleston, S. Car.
Greenwood, Miss Helen E., 5 Benefit Terrace, Worcester, Mass.
John Crerar Library, Chicago, Ill.

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CONTENTS

Notes of a naturalist afloat—IV
WILLIAM EDWIN SAFFORD 65

Vermont, the fern lover's paradise
HAROLD GODDARD RUGG 83

Another station in central Vermont for Dryopteris filix-mas and for the new hybrid filix-mas × marginalis
F. E. CORNE 93

Notes and news 96

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American Fern Journal

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Notes of a naturalist afloat—IV

WILLIAM EDWIN SAFFORD

Hispaniola

The republics of Haiti and Santo Domingo are situated on an island remarkable for its beauty and fertility. In reporting its discovery to his sovereigns Columbus enthusiastically declared "la Isla Española es una maravilla." And indeed no fairer vision can be pictured than its high verdure-clad mountains rising abruptly out of the ocean, with here and there a stretch of sandy beach of dazzling whiteness fringed with palm trees, and with luxuriant mangrove thickets bordering its estuaries. Its beauties have been sung by more than one of its own dark-skinned poets; for though the bulk of its population is composed of unlettered negroes, it numbers among its better classes men who have received their education in France, among them several writers of beautiful French prose and verse. The father of France's greatest romance writer, Alexander Dumas, was a Haitian mulatto; and one has only to open the volumes of verse by Tertullien Guilbauld (Feuilles au Vent) and Alcibiade Fleury Battier (Sous les Bambous) to find charming poems, which breathe the soft tropical atmosphere of the beautiful island.

[No. 2 of the Journal (2: 33–64. *pl. 2, 3, portrait*) was issued 11 My 1912.]

The name Isla Española, which Columbus applied to the island, or rather its Latin equivalent, *Insula Hispaniola*, persisted for many years, usually in its abbreviated form, Hispaniola. Its principal city, the seat of the governor, was Santo Domingo on the southern shore of the island, and this city lent its name to the entire island, just as the Puerto Rico de San Juan gave its name to the island on which it is situated. The island was consequently called Santo Domingo, or by the French Saint Domingue, until after its independence, when *Hayti*, or *Haiti*, one of its ancient Carib names, was revived, the signification of which is "Highland." This name is now confined to the eastern republic, the language of which is Creole French, while the name Santo Domingo, or Republica Dominicana, is retained by the western republic, where Spanish is spoken.

The *Powhatan* came to anchor in Samana Bay, off the village of Santa Barbara, on February 19, 1881. This magnificent bay, situated at the northeastern corner of Santo Domingo, is a natural harbor large enough to shelter an entire fleet. At the time of our visit the *U. S. S. Despatch* was making a survey of its shores and reefs, and afterwards, during our war with Spain it was a convenient point for our transports and other vessels to assemble. It is protected from the ocean swell by a line of coral reefs with a passage at the northern end wide and deep enough for the largest vessels; and it is sheltered from the prevailing northeast winds by the peninsula of Samana, a continuation of the northern range of mountains which traverses the island from east to west.

As soon as we dropped anchor, I was sent with a large bag of mail to the *Despatch*, which was received with delight by her officers and crew, who had been weeks without news from home. They had been much hampered in their work by the continuous rains and were anxious to get

away. From the ship the island seemed one mass of verdure, which might well serve as a picture for illustrating the vegetation of the "moist tropical forests." The rain poured down in torrents throughout our entire stay, with only occasional glimpses of the sun. We could see the dark-skinned natives, most of them half dressed, with their little children, entirely naked, looking at us through the rain, from the doors of their thatched huts beneath the coconut palms which fringed the shore. We felt a certain envy of them, for our oilskins were hot and sticky, and we felt sure that if we should take up our residence on shore we would revert to the dress of our first parents, with perhaps the addition of a little coconut oil for our skin's sake. The commanding officer paid an official visit to the local authorities, which was promptly returned by the governor and his suite. The governor was a pleasant looking mulatto, but several of his companions were unprepossessing barefoot negroes. They stayed to luncheon with the captain, and I was called upon to act as interpreter. They appeared to be very friendly toward the United States but warned us against the Haitians, whom they pictured as savage brigands and haters of the Yankees. I was surprised to find that they spoke excellent Spanish, with but few idiomatic peculiarities, in striking contrast with the Haitians I afterwards met, whose Creole French is scarcely intelligible to a foreigner, though very pretty to listen to.

From one of the most intelligent of the governor's suite I learned that the shores of Samana Bay abounded in fine mahogany and other timber trees and that there was gold to be had in limited quantities on the peninsula of Samana itself; but that there was no organized industry for exploiting either mining or the exportation of lumber. Sugar was cultivated in the interior valleys, but lack of roads prevented its being brought to the coast.

Tobacco, corn, and a limited amount of cacao were also cultivated, but agriculture on an extensive scale could not be carried on for lack of laborers.

When I expressed my surprise at this and referred to the former prosperous condition of the colony, which was the first European settlement in America and at one time the pride of Spain, the colored man said: "Señor, it's all very well to talk of the former prosperity of Santo Domingo. It was prosperous only because the owners of mines and plantations had slaves whom they compelled to work for them. When the slaves were freed they naturally preferred to work for themselves instead of for the profit of others. You call the country people poor and ignorant, but most of them get a comfortable living from their little garden patches, and as they do not have relations with the outside world, they haven't much use for reading and writing. The roads are miserable; but when we try to get them repaired the country people declare that they don't feel called upon to wear themselves out building roads for carts and carriages while they themselves haven't even horses to ride. Almost the only way we can get anything done is to force our enlisted soldiers to work." When I went ashore the following day, I saw this man officiating as marker in a billiard room.

The village of Santa Barbara was not attractive. The natives seemed to care little for ornamental trees and shrubs. A horseback ride to the interior over a miserable muddy trail—it could not be called a road—revealed a few patches of maize, tobacco, and mandioca, the latter of two kinds: the sweet, which is eaten as a vegetable, and the bitter, which is poisonous until certain deleterious principles are removed, when it is made into a sort of cake or bread.

By the sides of the trail there were banks of ferns very similar to those I had seen in Porto Rico, together

with Piperaceae, Melastomaceae, red-flowered Cannas, bananas, and plantains, together with certain succulent gingerlike plants, which I afterwards found to be species of *Alpinia* and *Renealmia*, and the aromatic *Curcuma* from which the East Indian curry is made.

On one hillside plantation, composed principally of bananas and plantains, with a little tobacco, coffee, and cacao, we found a white man, who was eager for news of the outside world and begged for newspapers and magazines, no matter how old. A brood of little mulatto children were playing about his cottage, and he seemed very fond of them, but we did not see their mother. Among the fruit trees we noticed soursops, or guanábanas (*Annona muricata*), star-apples (*Chrysophyllum cainito*), mangos (*Mangifera indica*), and aguacates, or alligator pears (*Persea gratissima*); and for ornamental purposes there had been planted a few shrubs and small trees, such as the oleander (*Plumeria alba*) and the common flower fence (*Poinciana pulcherrima*). In a hedge we saw the physic nut (*Jatropha curcas*), the jobo plum (*Spondias lutea*), and the coraltree (*Erythrina corallodendron*), the limbs of which readily take root when stuck into the ground. Other hedge plants were lemons and limes, which are apt to form thickets if not kept in check.

The following day, protected from the wet by a raincoat, rubber boots, and an umbrella, I attempted to climb the ridge forming the backbone of Samana peninsula. My guide was a little colored boy, who seemed glad to answer my questions, but who, I afterwards thought, tried to make me lose my bearings. He guided me up the hillside along paths and through thickets of catclaws, across marshy places, and under giant trees clothed with epiphytes and hung with lianas, until we came to an opening in the woods, which proved to be

his home. In the center of a clearing was a hut made of bamboo and thatched with palm leaves, with the bare ground for a floor and with two rooms. The only utensils I saw were a few gourds, an iron kettle and one or two earthenware pots for cooking. There were also a table, a bench, and two chairs. Around the house there was a small garden in which I saw growing some inferior tomatoes, large purple eggplant, ochra, red peppers, and *Hibiscus sabdariffa*, with acidulous red calices eaten by the natives, sometimes called Jamaica sorrel. But to me the most interesting plant was a large-leaved arum resembling Polynesian taro, which proved to be a species of *Xanthosoma* or "Carib cabbage."

It began to rain in torrents and I went into the hut for shelter. The roof leaked in many places, although this fact did not seem to cause the inmates the least concern. The boy introduced me to his mother and grandmother, both of them fair-looking mulattoes with a certain dignity of manner. When the rain ceased I told my guide I was ready to return, but to my surprise he refused to accompany me back unless I should promise him a much larger fee than that which we had agreed upon. This I refused to do; whereupon, on taking my departure, the two women pointed to a road, which I was sure would take me toward the center of the island instead of to the shore of the bay; so I thanked them, and followed the path by which we had come, as nearly as I could remember. This led me through several marshes and swampy places. My hands and face were scratched by the sharp prickles of catclaws, and several times my progress was arrested by impenetrable thickets, but I finally arrived at the landing on the snow-white beach and reached the ship in time for dinner.

The interior of Santo Domingo remained comparatively unknown to botanists until the exploration of Baron Eggers, an account of which appeared in Peter-

mann's Mittheilungen, in 1888.* More recently extensive collections have been made by the Reverend Father Fuertes in the vicinity of Barahona, on the south coast, near the Haitian frontier, and by Baron von Tuerckheim in the vicinity of the interior village of Constanza and on its neighboring mountains, some of which (Pico del Valle and Monte Cucurucho) are as high as 2,500 meters. Among the interesting features of the interior are forests of pines and walnut and on the slopes of the mountains beautiful tree ferns. The higher altitudes have yielded many endemic species. Baron Eggers rediscovered the type of the genus *Fuchsia* (*F. triphylla*), and among the tree ferns collected by him on Monte Isabel de la Torre was one recently described by Wm. R. Maxon as *Cyathea crassa*. An interesting endemic climbing fern growing near Barahona is *Lygodium oligostachyum*. The collections of both Baron von Tuerckheim and Padre Fuertes are well represented in the United States National Herbarium.

My second visit to the island was in the summer of 1898, this time landing at Mole St. Nicolas, at the western extremity of the north coast. On this occasion we lay for a time off the island of Tortuga, where the early buccaneers and pirates had their stronghold. It happened that I carried with me a work written by one of them, a companion of Morgan at the time when he sacked the city of Panama. The work is entitled "Histoire des aventuriers flibustiers" and the name of the author Alexandre-Olivier Oexmelin. It gives a most interesting account of the *flibustiers* (a French corruption of the name freebooters); of their exploits by land and sea and their establishment on this island, with a description in the appendix of its natural history and of the methods pursued by the ancient Haitians as well as by the buc-

*A detailed account of Baron Eggers' exploration is given by Urban, *Symbolae Antillanae* 6: 280–291. 1909.

caneers in cultivating cacao, mandioca, and tobacco. It was through these outlaws that the French first gained a footing on the island of Hispaniola.

At Mole Saint Nicolas was the point where Columbus first set foot on the island of Hispaniola. The landing place at the time of our arrival must have been very much the same as it was at the time of the discovery, for there was no sign of a wharf and we were obliged to jump out of our boat and wade ashore. As one of our men-of-war had recently cut a telegraph cable leading from the Mole to the island of Cuba, we met with a cold reception at the hands of the Frenchman in charge of the cable station; and when we asked him for news he had nothing to tell us, although we afterwards learned that on the day preceding our arrival the Americans had landed without resistance on the island of Porto Rico.

As our stay was very short I had little opportunity to observe the vegetation of the eastern part of the island. I did, however, listen to some very pretty Creole French spoken by the colored wife of the Frenchman in charge of the cable station. I have since been able to supplement my botanical notes from a work by a Dominican friar, Père Nicolson, entitled Essai sur l'histoire naturelle de Saint Domingue, published in Paris in 1776; and from the Flore des Antilles by F. R. de Tussac, who lived on the island at the time of the terrible insurrection of the blacks. The former work was approved by the botanist Adanson, at that time *censeur royal*. It contains a list of 400 plants growing on the island. De Tussac's work is chiefly interesting from the account it gives, from a colonist's point of view, of the conditions of life on the island and the causes that led to the liberation of the blacks and their subsequent independence. In addition to these two works on Haiti I must mention Tippenhauer's Die Insel Haiti, a magnificent quarto published in Leipzig in 1893. From these sources, supplemented

by an examination of material in the U. S. National Herbarium collected in the northeastern mountains of the island in 1905 by Messrs. G. V. Nash and N. Taylor of the New York Botanical Garden,* I have been able to make a rough sketch of the vegetation of Haiti.

The climatic conditions of the island are very similar to those of Cuba and Porto Rico, with a luxuriant vegetation on the northern and eastern slopes of the mountains, due to the moisture laden trade winds which blow the greater part of the year; and with xerophytic conditions on the southern and western sides of the island, like those of similarly situated leeward sides of Cuba, Porto Rico, and Panama, with their aromatic scrubby bushes, their Cactaceae, and aloelike agaves. Many species of plants growing in Haiti are widely spread in the West Indies, but on the peaks of the highest mountains, which are considerably higher than those of Porto Rico, the vegetation shows features more nearly akin to the temperate mainland; and as these peaks are isolated it is not surprising that species are found which are endemic or peculiar to the island.

The common strand plants are for the most part the same as those of the Bahama Islands and the Florida Keys. The goats-foot convolvulus (*Ipomoea pes-caprae*) is here called patate bord-de-mer (seaside sweet potato), and *Canavalia obtusifolia* pois-cabrit (goat pea), because goats are very fond of its succulent leaves; while the hard, polished seeds of *Guilandina crista* (*Caesalpinia bondu-cella*) are called caniques or queniques. The seaside plum, *Ximenia americana*, is commonly known as prunier épineux and *Chrysobalanus icaco* as icaquier or zicaquier. In places there are impassable thickets of a thorny scrambling plant, *Pisonia aculeata*, called croc-chien (dog tooth) on account of its recurved prickles. *Pari-*

*See Jour. N. Y. Bot. Garden 6: 170–191. 1905.

tium tiliaceum, the "hau" of the Hawaiians, is here called mahot, or mahot-franc to distinguish it from other mahots; and the name bois grisgris is applied to *Bucida buceros*. Belonging to the Bombacaceae is the *Ceiba pentandra*, here called fromager, the flowers of which are distinguished from those of the other genera of the same family by the possession of only 5 stamens. The young trees are studded with stout thorns and the old ones often have a swollen trunk very different in appearance from the common form seen in the Philippines, yet not held by botanists to be specifically distinct from it. The floss-like down which fills its pods is known in Haiti as coton-siffleux. Related to this tree is *Ochroma lagopus*, which has large 3-lobed instead of palmately 5-compound leaves as in *Ceiba pentandra*, and its flowers have many stamens in clusters. The wood of this tree, which is very light, is known as bois-liége (cork wood) and is used for making rafts and floats for fishing nets.

The mangrove formation at the mouths of streams and the muddy shores of estuaries is composed chiefly of the common species of the West Indies, here called mangliers or palétuviers. The name mangle-chandelle (candle mangrove) is applied to *Rhizophora mangle* on account of its elongated fruit, though it is also called manglier rouge, or palétuvier rouge; the names manglier blanc and manglier gris are loosely applied to both *Laguncularia racemosa* and *Conocarpus erectus*, though the latter is also called manglier bouton, on account of its buttonlike cones; and *Avicennia nitida* is variously designated as manglier noir, palétuvier blanc, or manglier salé. These mangroves form an almost impenetrable thicket and are still more closely bound together by certain lianas, especially by the Apocynaceous liane mangle (*Echites biflora*), and a climbing Bignonia called liane crab (*Cydista aequinoctialis*) from the stems of which the natives weave baskets and fishtraps. Other plants of this formation

are the gombo mangle (*Pavonia racemosa*) with pale orange flowers, belonging to the Malvaceae; mangle oseille, or sorrel mangrove (*Dodonaea viscosa*); and *Coccoloba uvifera*, called raisinier du bord de la mer. The only ferns associated with these plants are *Acrostichum aureum* and *Blechnum serrulatum*.

The vegetation of the arid plains is characterized by Cactaceae, agaves, Bromeliaceae, and Mimosaceae. Among the opuntias, called raquettes by the Haitians, are *Opuntia haitiensis* Britton, a very spiny plant allied to *Opuntia ferox*, collected by Nash and Taylor near Gonaïves, with trunks 3 or 4 meters high, with spines sometimes 12 cm. long, and yellow flowers; and *Opuntia tuna*, with edible fruit. Among the Nopaleas, with rose-colored flowers, are *Nopalea coccinellifera*, the host of the cochineal insect, and *Nopalea moniliformis*. Among the columnar cacti are *Pilocereus Schlumbergeri* Weber and *Cephalocereus polygonus* (Lam.). In addition to these are the leaf-bearing *Pereskia aculeata*, with edible fruits called groseilles, or "gooseberries," and a *Melocactus* called tête d'Anglais (Englishman's head).

In calcareous formations grow species of *Amyris*, called bois de chandelle or candlewood, *Morinda citrifolia*, calabash trees (*Crescentia cujete*), *Pedilanthus tithymaloides*, which is a Euphorbiaceous plant with caustic milky latex, species of *Condalia* and *Bumelia*, the leafless threadlike *Cassytha americana*, species of *Phyllanthus* (en bas-feuilles) with leaves that sleep, pinnate-leaved acacias called tendre-à-caillou and gras-de-galle; palmetto palms (*Thrinax* spp.); and among the ferns *Aneimia adiantifolia*, *Asplenium dentatum*, and species of *Cheilanthes*. *Bromelia pinguin* is used for hedges together with species of agave and yucca; and the true aloes of Europe, *Aloe vulgaris*, has established itself in many places.

On the margins of ponds and in marshy places farther inland than the common mangroves occurs the alligator

apple (*Annona glabra*), here called bois flot from the lightness of the wood of its roots. Its smooth applelike fruit is not edible, while that of the prickly *Annona muricata*, here called corosol, has an ill-scented skin but pleasantly acidulous edible pulp. Closely related to the latter, but with shorter prickles, larger and lighter-colored seeds, and inedible pulp, is the wild *Annona montana*, or corosol montagne. Other related species sometimes known as custard apples are *Annona squamosa*, here called pomme cannelle, or cinnamon apple; *Annona reticulata*, called cachiman coeur-de-boeuf, or bullock's heart, and *Rollinia mucosa*, called cachiman crême. The latter species was described by de Tussac as *Annona obtusiflora*, from a specimen cultivated by a French colonist living near the western end of the island.

One of the most important fruits of the island is *Mammea americana*, here called abricot, on account of the orange-colored pulp of its fruit. Another is *Chrysophyllum cainito*, known as caimitier, belonging to the sapote family. Allied to this is the sapotillier (*Achras sapota*) and the sapote, sometimes called marmelade or jaune d'oeuf (*Lucuma mammosa*), remarkable for its peculiar large polished seed. In addition to the endemic fruits are the introduced breadfruit, mango, oranges, lemons, limes, bananas, plantains, rose apple (*Eugenia jambos*), the monbin de Tahiti (*Spondias dulcis*), and Spanish plum (*Spondias purpurea*), related to the native monbin (*Spondias lutea*), which together with bois-immortel (*Erythrina corallodendron*) is often seen growing in hedges or living fences along the sides of the road. Erythrinas are also used for shade on coffee and cacao plantations, together with the quickly growing Ingas. The latter are called pois-doux by the natives on account of the soft white sugary pulp contained in the thick pods. *Genipa americana* yields a violet dye sometimes used for ink, but its color is not permanent. *Hura crepitans*,

called sablier or sandbox, is often seen near the villages; and another Euphorbiaceous tree, described and figured by Père Nicolson as "noisettier" (loc. cit. 276. *pl. 2*) I have identified as the candle nut of Polynesia, *Aleurites triloba*, the beloved *kukui* of the Hawaiians, who eat its oily kernels together with certain seaweeds as a relish at their feasts. Among the Myrtaceae are the common guava (*Psidium guajava*), from which excellent jelly is made; *Amomis caryophyllata* (*Pimenta acris*), the source of bay rum, here called bois d'Inde; the introduced pomme de Tahiti (*Eugenia malaccensis*); and the giroflier, or cloves tree (*Eugenia aromatica*) from the Malay Archipelago, which is occasionally cultivated.

In the gardens of the country people many of the same vegetables are cultivated as in Porto Rico and Cuba. The indigenous ones have lost their Carib names but have been given pretty Creole names instead, and there are many introduced species. Tomatoes are called amourettes, the spiny *Solanum aculeatissimum* amourettes bâtardes; peanuts (*Arachis hypogaea*) are called pistaches, the introduced eggplant (*Solanum melongenum*) aubergine or bringène (a corruption of the Spanish berenjena). In addition to the common African gombo (*Abelmoschus esculentus*) a closely allied species called ambrette (*Abelmoschus moschatus*), with seeds tasting exactly like musk, has been introduced. *Cajanus indicus* is known as pois de Congo, a name which indicates its origin; and introduced yams of several kinds are known as ignames. Several species of *Amaranthus* together with other pot herbs are known by the general name of calalou. Red peppers (*Capsicum annuum* and *Capsicum frutescens*) are called piment. Several forms of them occur, one of which, with small hot pods, is appropriately known as petit piment enragé. The introduced turmeric plant (*Curcuma longa*) is called saffron, and the endemic *Bixa orellana* roucou. Among the ornamental

plants are *Poinciana pulcherrima*, here called fleur de paradis; *Plumeria alba* and *Plumeria rubra*, called franchipannier; the fragrant henna of the Egyptians (*Lawsonia inermis*), called réséda; the yellow-flowered *Allamanda cathartica*, called liane à lait, from its milky latex; and the common oleander is known as laurier rose.

Several roadside weeds with burlike fruits belonging to the Malvaceae and Tiliaceae (*Urena* and *Triumfetta* spp.) are known as grands cousins, cousins petits, or mahot-cousins; and the leafless parasitic dodder (*Cuscuta americana*) as herbe-z'amitié (friendship herb).

Among the medicinal plants *Dianthera pectoralis*, called herbe à charpentier, is highly esteemed. Other plants used medicinally are *Piper peltatum*, called herbe à colet or queue de lézard, used in the form of cold infusions as a diuretic; *Cassia alata*, called herbe à dartres, used for parasitic skin diseases; and several species of *Adiantum*, called capillaire.

The forests of the island abound in fine timber trees, the most valuable of which is perhaps the mahogany, locally known as acajou, or acajou-à-planches (*Swietenia mahagoni*) to distinguish it from the fruit-bearing acajou-à-pommes (*Anacardium occidentale*) which is not in the least related to it. The name of the latter should in all probability be cajou, instead of acajou, derived from the same aboriginal names as cashew and cajuil, applied to the species in Jamaica and Porto Rico. The mahogany of Santo Domingo, often called Spanish mahogany, is prized above all others for its beautifully figured grain. *Cedrela odorata*, the fragrant wood of which cigar boxes are made, is also called acajou, or acajou senti, and is of the same family as the mahogany. Both are large trees with pinnately compound leaves, clusters of inconspicuous flowers, and fruit dehiscing into 5 valves. Lignum vitae (*Guaiacum officinale*), called gayac, or gaillard franc by the Creoles and malira by the primitive Caribs, is the

source of the hardwood used for sheaves of pulleys, cog-wheels, etc., derived only from the heartwood of the tree. Gaillard bâtard, or gayac bâtard, mentioned by Père Nicolson, is probably *Guaiacum sanctum*. Both trees are found on the "mornes" of the island. Santo Domingo "ebony" is the wood of the leguminous tree *Brya ebenus*, also called green ebony. It takes a fine polish and is highly prized for inlaying and for making flutes. The so-called French oak of the island is *Catalpa longisiliqua*, a tree belonging to the *Bignonia* family. Other fine timber trees of this family, called chênes (oaks) by the French and encinos or robles by the Spaniards, belong to the genus *Tecoma* or *Tabebuia*. Box wood and white-wood are names applied to *Tecoma leucoxylon*, and the latter name also to *Tecoma pentaphylla*, which in the French Antilles is known as the poirier, or native pear tree.*

In the forests, climbing over the highest trees to seek the light and scrambling over hedges and roadside bushes, are numerous lianas, some of them remarkable for the beauty of their flowers and some for their medicinal virtues. Père Nicolson gives a long list of them, but the plants to which he refers cannot all be identified. Species of smilax, called zarzaparilla in Mexico, are known in Jamaica as lianes bambouches; the false zarzaparilla, or liane bambouche bâtarde, is *Cocculus domingensis*, while *Cisampelos pareira* is called liane amère, or "bitter-vine." *Tragia volubilis*, which has its tender young branches and leaves clothed with stinging hairs, is called liane brûlante; *Hecastophyllum monetaria*, of which barrel hoops are made, is called liane à barrique; the well-known snuffbox seabean *Entada scandens* is called liane coeur-de-Saint-Thomas, and the oxeye sea-

*These names are taken from the Flora Phanerogamique des Antilles francaises, by the Rev. Père Duss. Annales de l'Institut Colonial, vol. 3. Macon, 1897.

bean (*Mucuna urens*) yeux de bourrique or liane à cacone. The names liane à caleçon and liane fer-à-cheval are applied to species of *Aristolochia* and of *Passiflora*, with 2-lobed leaves shaped more or less like a pair of trousers or like a horseshoe; while *Aristolochia anguicida* is called liane à corbillon, because its seed pods resemble miniature baskets. The well-known antidote cacoon of Jamaica (*Feuillea cordifolia*) is called in Haiti liane boîte à savonette, on account of its fruit, which is like a spherical box filled with irregular flattened disklike seeds more or less resembling small cakes of soap, and on account of its real or supposed medicinal qualities it is also called liane à contre-poison, or in Spanish *bejuco de contrayerba*. A certain vine of the forest, yielding draughts of clear water to the thirsty hunter (probably a species of *Cissus* or *Vitis*), is called liane-à-eau or liane-des-chasseurs. An *Ipomoea* resembling the jalap of Mexico (probably *I. tuberosa*) is known as liane à médecine or liane purgative. Other species of *Ipomoea* are called lianes à tonnelle or lianes à berceau (cradle vines); while species of *Paullinia* are called lianes à scie (saw vines) from their peculiar stems, or lianes à persil (parsley vines) from their pretty compound leaves; and the plant which produces the little black-and-red seeds known as crab's eyes (*Abrus precatorius*) is known as liane à réglisse. The passion flowers are called pomme-liane. This name is especially applied to *Passiflora laurifolia*, while *Passiflora maliformis* and *P. serrata* are called pomme-liane à agouti, and the large-fruited *P. quadrangularis* is called barbadine. Another name for the fruits of the passion flowers is grenadille, the diminutive of grenade, given it because of the many seeds enclosed by the outer shell, as in the case of the pomegranate.

In the United States National Herbarium there are a number of ferns collected in the mountains of Haiti

by Nash and Taylor, on the expedition to which I have already referred. From the Corail region, west of Port Margot, they brought back *Ceropteris calomelaena*, *Goniophlebium chnoodes*, *Phlebodium aureum*, *Meniscium reticulatum*, *Dryopteris serra*, *Diplazium Urbani*, and species of epiphytal filmy ferns of the genus *Trichomanes*. Between Port Margot and Pilate they collected *Asplenium rhizophorum*, *Asplenium rectangulare*, *Adiantum cristatum*, *Trichomanes scandens*, *Polypodium elongatum*, and species of brackenlike *Pteridium* and *Dicranopteris*. Near the mountain village of Marmelade, at an elevation of 2,750 feet, they collected *Dryopteris sancta*, *Dryopteris tetragona*, *Dryopteris reptans*, *Paltonium lanceolatum*, *Campyloneurum angustifolium*, and *Asplenium erosum*; and in a beautiful ravine, an hour's ride from Marmelade, down the perpendicular sides of which cascades were dashing, they collected *Campyloneurum cubense*, *Tectaria heracleifolia*, *Asplenium formosum*, *Eschatogramme furcata*, and the widely spread *Adiantum tenerum*, called capillaire by the natives. On Mount Balande, near Gonaïves, they found *Xiphopteris serrulata*. In the vicinity of Gonaïves, which is a dry xerophytic region, there were few ferns, except species of *Cheilanthes*. On the return trip to Bayeux, from which they had started, they collected a tree fern (*Cyathea Tussacii*), *Alsophila quadripinnata*, and *Struthiopteris polypodioides*.

It is not the province of the present paper to repeat the tragic history of this island: the extermination of the aboriginal Indians by the Spaniards, who enslaved them and forced them to work in mines and plantations beyond their endurance; the introduction of thousands of slaves from Africa (Columbus' own son was the first African slave owner on the island); the uprising of the blacks and the massacre of their masters; the emancipation of the slaves and their enfranchisement before they were at all fitted for self government; the incapacity

and selfish greed of the men they chose to be their presidents, many of whom were cruel tyrants, who violated the constitution, caused themselves to be crowned king or "emperor" and imitated the ceremonial pomp of European royalty. Few of the leaders of the black islanders seem to understand the principles of republicanism or to have the welfare or progress of the people at heart. Many of the schools of the island are now closed for lack of pupils, and it may be largely owing to lack of education that the practise of sorcery or voodooism, very similar to that of our own southern negroes, persists.

Much good land susceptible of cultivation now lies idle for want of laborers. In nearly every case where plantations are worked successfully the labor is performed by miserably paid soldiers under the supervision of their petty officers, hired out to the planters like gangs of convicts. This is especially the case on the farms of government officials. To avoid conscription the men of the lower classes keep away from the towns, remaining in the mountains at a safe distance and sending their wives to town to do necessary errands. Who can blame them for preferring the freedom of their homes, where the generous soil yields them a just return for their daily work, to the constraint of forced labor for the profit of others? In spite of these conditions there is generous hospitality and a certain light-hearted gaiety still among the black people, and one may frequently hear the drumming of the African bambola, calling them together for their dances, as in certain parts of Louisiana.

The problems which the leaders of the Haitian Republic have to solve are not simple. It is to be hoped that the reins of government will be placed in the hands of rulers, not only intelligent and well educated, but just and humane, alive to their responsibility and inspired with a love for their fellow countrymen. What the future of the island will be, time only can tell.

Vermont, the fern lover's paradise*

HAROLD GODDARD RUGG

For the person seeking a vacation resort in which he can find good botanizing, especially in the line of pteridophytes, I can recommend no better place than Vermont. Of the 109 species, varieties, and forms of these plants mentioned in Gray's New Manual 74 have been reported from Vermont. Of these it has been my good fortune to find all but thirteen. In addition to this number, all of the described hybrids except *Dryopteris Goldiana* × *spinulosa* Benedict and *D. cristata* × *Goldiana* Benedict have been reported in Vermont, and these two undoubtedly occur within the Vermont boundaries. Hardly a season passes but what some new and interesting botanical find is reported from Vermont. This last summer Miss F. E. Corne of Cambridge, Mass., was fortunate in finding *Dryopteris filix-mas* (L.) Schott, the male fern, in Barnard, Vermont, and also its hybrid with *D. marginalis* (L.) A. Gray in the same place. This is the fourth station in Vermont, and in fact in all the eastern United States, for the male fern and the second for the hybrid. Mr. E. J. Winslow was the lucky man to discover the hybrid, at a field meeting of the Vermont Botanical Club at Bridgewater in 1910. Why is it that this rare *filix-mas*, found not nearer than the eastern end of the Gaspé peninsula to the north and not nearer than northern Michigan to the west, has been found elsewhere only in Vermont and only in four adjoining Vermont towns: Barnard and Hartland, the first recorded station discovered September 1905 by Miss Nancy Darling, Woodstock and Bridgewater, stations found later by Miss Mabel Strong? May not this fern be looked for elsewhere in the state? The search for this rare fern alone should bring many fern lovers to our borders.

Undoubtedly the rarest fern ever found in Vermont is

*Presented at the winter meeting of the Vermont Botanical Club, March 1912.

the rare hybrid *Asplenium trichomanes* × *ruta-muraria* Ascherson, a single plant of which was found Aug. 29, 1905, in Proctor, Vermont, by the late Miss G. A. Woolson. This is the only time on record when this fern has been found in America. The late Mr. George Davenport, in describing this fern in Rhodora, January 1906, states that the American specimens differ slightly from the described European forms in that the "lower pinnae are more deeply lobed or even divided." Now why should not others find this rare fern among the rocky pockets of western Vermont where both the parent plants are common? Miss Woolson, who discovered this rarest of all Vermont ferns, was also very successful in finding *Asplenium ebenoides* Scott in Vermont. She found this hybrid at Proctor and at Pittsford. It was first reported from Vermont in 1897, when it was discovered at Rutland by Mr. G. H. Ross. The only other Vermont stations are Salisbury and Brandon, the latter station discovered recently by Mr. D. Lewis Dutton. Vermonters living east of the Green Mountains can hardly hope to find this hybrid (now recognized as such, due to the study of Miss Margaret Slosson) as one of the parent plants, *Camptosorus rhizophyllus* (L.) Link, the walking fern, has been reported, I believe, from only six stations east of the Green Mountains: Brattleboro, Springfield, Windsor, Norwich, Plymouth, and Royalton.* The scarcity of this fern in eastern Vermont is due, of course, largely to the absence of limestone ledges. All of these stations, save the one near West Brattleboro, are small and the Windsor locality has been lost. In the Norwich station, located on the Loveland farm, which I have been fortunate enough to visit now and then, there is only a handful of plants. Well do I remember the day a few years ago in which I discovered the walking fern. I had gone pleasure-bent to Ethan Allen Park, Burlington, and suddenly came unexpectedly

*Since this paper was read I have found the fern at Hartland, Vt.

upon an isolated boulder covered with this charming fern. I took home plants for my garden, placed lime in the soil about them, and succeeded in keeping them alive for two or three years.

I do not wish to give a check list of Vermont ferns, as that has been done so well by Mr. W. W. Eggleston in his article, The Fern Flora of Vermont, in the Fern Bulletin, April 1905, but I shall give a few notes about some other species. Vermont claims seven of the Aspleniums beside *Asplenium ebenoides* Scott, previously referred to. To me the *A. viride* Huds. is one of the most delicate of our ferns and one worthy of a long day's tramp and scramble among the rocks. It was my good fortune to see this fern first in Smuggler's Notch and later at Mt. Hor, Lake Willoughby. Dr. Kennedy, in his Flora of Willoughby, Vermont, had included *A. viride* Huds. His evidence that the fern grew on Mt. Hor rested on two single loose fronds found at the foot of the precipitous slopes of the mountain. The growing fern was not discovered until Sept. 2. 1905, when Mr. E. J. Winslow risked his life in making the dangerous ascent of Mt. Hor. He was successful in locating the station and in 1910 guided me to the coveted spot. This station has, I believe, been visited by but two or three other fern lovers. Growing with *A. viride* on Mt. Hor may be found *Woodsia glabella* R. Br. I have tried to grow the little green spleenwort in my fernery, but unfortunately it has lived only a year or two. Mr. E. Gillett of Southwick, Mass., has it growing most successfully in his nursery, and last year I saw there some of the largest clumps I have ever seen. Beside the two mentioned stations for *A. viride*, it has been found at Camel's Hump, first by Mr. C. G. Pringle, and in Plymouth by Miss Strong. This last station, discovered a few years ago, is the lowest elevation at which the plant is known to grow.

Asplenium trichomanes L. is fairly common throughout Vermont, but its form *incisum* Moore is extremely rare. The latter has been reported, I believe, from Brattleboro, Hartland, and Norwich. The most deeply cut specimen of this form I have ever seen is in the Jessup Herbarium at Dartmouth College. *Asplenium platyneuron* (L.) Oakes is frequently met with. Its variety *serratum* (E. S. Miller) B. S. P. has been found in Pittsford and the variety *incisum* (E. C. Howe), named by Davenport as *Asplenium ebeneum* var. *Hortonae*, has been reported from Brattleboro and also from Pittsford, the latter one of the richest towns in the state in respect to its fern flora. Miss Slosson has reported forty-five species and six varieties from a three-mile triangle at Pittsford. In addition she has found there several of the hybrids, including the very rare *Dryopteris marginalis* × *spinulosa* Slosson. Although this fern was recognized by Miss Slosson as a hybrid when it was first described, it was named *Dropteris pittsfordensis*.* A new station for this hybrid was found at Sherburne Mountain, July 8, 1909, and later, on Aug. 16, 1911, by Mrs. A. B. Morgan. The great variety of ferns reported from Pittsford, as well as from Dorset and Hartland, is due, doubtless, in some part to the fact that so many botanists have made these towns their headquarters. *Asplenium ruta-muraria* L. is found only in western Vermont, with the exception of a small station on Willoughby Mountain, or Mt. Pisgah as it is now called, and most frequently on lime rocks. *Asplenium angustifolium* Michx. is frequently seen, and in the stations in which I have found it it has always been associated with *Dryopteris Goldiana* (Hook.) A. Gray. Of course *Asplenium filix-femina* (L.) Bernh. is common everywhere, but one of its varieties deserves mention here. In 1897, at Woodstock, a single plant

* Rhodora 6 : 75–77. *f.* 1–3. 6 Ap 1904.

of the variety *polyclados* Moore was found. This one plant was transplanted to the fernery of Miss Elizabeth Billings, where it has increased so that now there are several plants. This fern is one of the most striking that I have ever seen, and Mr. B. D. Gilbert said it was the most profusely branched and tufted variety of *A. filix-femina* that he had seen in this country.

Polystichum acrostichoides (Michx.) Schott and its incised variety are common. For several years I have had a peculiar form of this fern growing in my fern garden. It is interesting because of the truncate form of pinnae and the multifid form of the tip of the frond. The sterile fronds are usually like those of the type plant. This fern I transplanted into my garden several years ago, and ever since then it has continued to bear these peculiar fronds. The late Mr. B. D. Gilbert was interested in the plant and asked permission to describe it in the Fern Bulletin, but illness and finally his death prevented. *Polystichum Braunii* (Spenner) Fée is not rare in Vermont and may be looked for on high elevations or in low situations where there is a deep cool glen or ravine. Vermonters can boast of the type station of this fern at Smuggler's Notch, Mt. Mansfield. Mrs. Elizabeth B. Davenport found this fern in southern Vermont, at Brattleboro, at an elevation of not over 1,000 feet.

Of the genus *Dryopteris, D. simulata* Davenport is probably the rarest. This fern, found along the southern and eastern borders of the state, should be found more commonly in Vermont. To my knowledge there are only two Vermont stations, Brattleboro and Hartland, and unfortunately the exact location of either station is unknown today. This fern is abundant at Hinsdale, N. H., a town separated from Brattleboro, Vermont, only by the Connecticut River. *D. fragrans* (L.) Schott has been found at Mt. Mansfield, Bolton Notch, Camel's

Hump, and Mt. Zion. I have been fortunate enough to see this fern growing at Mt. Mansfield and Mt. Zion. This latter station, discovered in 1898 by Mr. G. H. Ross of Rutland, is most interesting. The station has been visited but three times since its discovery, first by Mr. Ross and Mr. Eggleston, second by Mr. Ross and Mr. Kirk, and in 1911 by Mr. Kirk and myself. One day in the early fall of 1911 Mr. Kirk and I tramped to the station from the electric car line in Castleton. As Mt. Zion is only a small hill of an elevation of about 1,000 feet and as other adjacent hills are similar in height and in appearance, it is not easy to locate the station. We discovered what we supposed to be the location and examined it closely several times, but not a single specimen of the fragrant fern did we find. After eating our lunch of toasted bacon and bread we were about to leave Hubbardton when by chance we discovered another hill with a rocky side, and here was our *D. fragrans* growing on the sheer face of a cliff fifty to seventy-five feet in height. Most of the plants grew on the east, while some grew on the northern wall of this rocky ledge, and all were sheltered from the sun and wind by trees growing near the ledges and hiding them. From a short distance away no one would suspect that one of the rarest New England ferns could be found near. In all, there were, perhaps, seventy-five plants, most of which, fortunately for botanists of future generations, are secure from collectors except those using ropes to be lowered over the cliffs. Some of the plants were very large and had about thirty fronds, I judge, of which only half were green. The peculiar appearance of the old dried and curled fronds surrounding the green living growth, together with the delightful woodsy fragrance, makes the identity of this fern easy to determine. This station is probably the farthest south in the eastern United States. Other members of the *Dryopteris* group that may be

found in the state are *D. Goldiana* (Hook.) A. Gray, *D. Boottii* (Tuckerm.) Underw., rather rare, *D. cristata* (L.) A. Gray, *D. Clintoniana* (D. C. Eaton), not nearly so common as *D. cristata*, *D. spinulosa* (Müller) O. Ktze., found in the highlands, *D. intermedia* (Muhl.) A. Gray, our most beautiful evergreen fern found in every deciduous forest. The so-called variety *dilatata*, found on the mountain peaks of Mansfield, Killington, Ascutney, and many others, proves to be the form *anadenia* (Robinson), while the true *D. dilatata* (Hoffm.) A. Gray remains still to be discovered in Vermont. One of the rarest plants growing in my fernery is *D. spinulosa* var. *concordiana* (Davenport), much more delicate in outline and in appearance and more yellowish green in color than the true *D. spinulosa* or *D. intermedia*. Mr. George E. Davenport had this plant growing in his fernery and gave part of his rootstock to Mrs. Emily H. Terry, who in turn kindly passed her plant on to me a few years later; and I have been able to pass on one small plant. This variety has, I believe, been found only at Concord, Mass., but we may hope to find it some day in Vermont.

Polypodium vulgare L. is found probably in nearly every town in the state, and in Burlington and Pittsford some of its varieties and forms have been reported. The three beech ferns, *Phegopteris phegopteris* (L.) Keys., *P. dryopteris* (L.) Fée, *P. hexagonoptera* (Michx.) Fée, are common in Vermont, although *P. hexagonoptera*, the broad beech fern, is quite rare. I have seen it growing at only one station in Vermont and that in Hartland. At the Hartland station there has been growing for three years a most interesting plant of this broad beech fern, with crested and plumose pinnae. The maidenhair, *Adiantum pedatum* L., and the brake, *Pteris aquilina* L., are likewise common. A variety of the brake, *Pteris aquilina pseudocaudata* Clute, was collected in Colchester

in 1903 by Mr. F. A. Ross. Up to that time Mr. Ross was the only person who had ever collected this fern in New England, but it has been lately reported from Nantucket and Cape Cod. Three sheets collected by Mr. Ross are in the herbarium of the University of Vermont and one in the herbarium of Mrs. Nellie F. Flynn. Three of these sheets were collected from burned-over ground, Colchester, and one from Woodwardia Bog, Fort Ethan Allen. This fern has not since been collected in Vermont, and it is hoped that in another year fern lovers may rediscover the fern for us.

Pellaea atropurpurea (L.) Link is limited, with two exceptions, I believe, to the limestone region of western Vermont. Mr. Levi Wild of the Vermont Botanical Club was fortunate in finding a few plants in Quechee Gulf in eastern Vermont, and several years later, with great difficulty, I was able to find the same plants or possibly another small station in the gulf. I believe Mr. Wild and I are the only people who have visited this station. I should advise no others to try to reach the same. The other station in eastern Vermont for the purple cliff brake is at Lake Willoughby. Quechee Gulf is also famous for being the home of our two alpine Woodsias, *Woodsia alpina* (Bolton) S. F. Gray and *W. glabella* R. Br. One naturally expects to find these ferns, as they are found, on the tops of our mountains, Mansfield, Camel's Hump, Pisgah, and Hor, but at Quechee Gulf they have sought the rocky and almost inaccessible side of a deep gorge, through which flows the Ottaquechee River. This gorge or gulf, as it is locally known, gives to the botanist *Woodsia ilvensis* (L.) R. Br. and *W. obtusa* (Spreng.) Torr., the latter sparingly, however. The latter is fairly abundant, I understand, in western Vermont, where the fronds are often a foot or more in length. It is rare in eastern Vermont, and where I have seen it growing it bears fronds usually

not longer than six or eight inches. At Mt. Pisgah Mr. Winslow was successful in finding the largest specimens I have ever seen of *W. alpina*. The largest frond he collected was eight inches long. Mr. George Lawson, in the Canadian Naturalist for 1864, speaks of the large specimens, often nine inches in length, which were collected in the Gaspé region, and suggests that the larger plant be distinguished as var. *Belli*. Another interesting Quechee Gulf fern is *Cryptogramma Stelleri* (Gmel.) Prantl. This is fairly abundant throughout Vermont in cool rocky exposures, yet it is rare enough to give the fern enthusiast a thrill of pleasure when discovering a new station. To my knowledge it is most abundant in Hartland, where one can view in June hundreds of the delicate little plants, most of which are inaccessible, fortunately for posterity.

Woodwardia areolata (L.) Moore has never been reported from Vermont, but its kin, *W. virginica* (L.) Sm., has been found in three widely distributed stations, Franklin, Colchester, and Rutland. I see no reason why the fern enthusiast should not add other Vermont stations for this fern, which I have seen growing only in Colchester, at a bog known as Woodwardia Bog to the Vermont botanists.

Dennstaedtia punctilobula (Michx.) Moore is common in rocky pastures and roadside wastes, but its variety *cristata* Maxon has been reported from Brattleboro only by the late Mrs. Horton, and the form *schizophylla* only from Dorset by Mrs. Terry. *Onoclea sensibilis* L. and *Matteuccia struthiopteris* (L.) Todaro are everywhere, as are *Cystopteris bulbifera* (L.) Bernh., in cool rocky glens, *C. fragilis* (L.) Bernh., the first of the deciduous ferns to uncurl its delicate fronds in the spring, and the three Osmundas. The only known station of *Osmunda regalis orbiculata* Clute is in Hartland, Vermont, and *O. Claytoniana dubia* Grant, known for some time

only from Vermont, has lately been reported from Maine, but *O. cinnamomea frondosa* Gray and variety *incisa* J. W. Huntington are fairly common, or at least not rare throughout the state. *Ophioglossum vulgatum* L., when once discovered, seems to spring up everywhere in moist meadow land, where the fronds are often eight inches long or longer, or in dry pastures, where the mature plants bear fronds only three or four inches in length.

The *Botrychium* group is represented by *Botrychium lunaria* (L.) Sw., discovered at Lake Willoughby. By this discovery of one single plant this interesting fern was added to the fern flora of New England, and as no other stations have since been reported, Vermont can claim the honors for the fern. *B. simplex* Hitchcock with its varieties and forms, according to some botanists, is fairly common throughout the state. It was my experience to plan to go to St. Johnsbury and to have Miss Rooney show me for the first time these plants, which she had previously described in the Fern Bulletin, but while en route to St. Johnsbury I discovered a few plants. The next summer I saw *B. simplex* growing in several places in Hartland, but search as hard as I might, I have never been able to find it in Norwich or in Cavendish, towns in which I have botanized to some extent. Large colonies of *B. ramosum* (Roth) Aschers. are frefrequently met with in May or June along the edge of some woodsy road, but *B. lanceolatum angustisegmentum* Pease & Moore I have found in Vermont only once and then in Hartland. *B. obliquum* Muhl., its variety *oneidense* (Gilbert) Waters and variety *elongatum* Gilbert & Haberer, *B. dissectum* Spreng., *B. ternatum* D. C. Eaton, and the ever present *B. virginianum* (L.) Sw. are native to the state.

One fern that the fern enthusiast may hope to add to the Vermont flora is *Lygodium palmatum* (Bernh.) Sw., the climbing fern. This fern is found in Massachusetts

not many miles from the Vermont line. The only known New Hampshire station is on a small knoll in a swamp in the town of Winchester, only twelve miles from Brattleboro, Vt. Surely some day this fern will be added to the Vermont list. The only other fern species common to New England and not yet reported from Vermont are *Asplenium montanum* Willd., *Cheilanthes lanosa* (Michx.) Walt., not found farther north than Connecticut, *Woodwardia areolata* (L.) Moore, found most frequently in damp woods, and *Asplenium pinnatifidum* Nutt.

Inasmuch as Vermont claims five or six species and varieties not found elsewhere in New England, the claim that Vermont is a fern lover's paradise would seem to hold true.

HANOVER, N. H.

Another station in central Vermont for Dryopteris filix-mas and for the new hybrid filix-mas × marginalis

F. E. CORNE

Late last August, 1911, quite by accident, I found a new habitat for *Dryopteris filix-mas* and for the new hybrid *D. filix-mas* × *marginalis*,* in a hillside field near Barnard, Vermont. The altitude was between 1,700 and 1,800 ft. I visited some woods on the heights above the little Silver Lake House, where there were said to be limestone ledges and where I had hoped to find the little wallrue, *Asplenium ruta-muraria*, and other small rock-loving ferns for which I had so far searched in vain. I was disappointed, however, in finding any of these. I found no small ferns, but larger ones were there in abun-

* Winslow, E. J. Am. Fern Jour. 1: 22, 23. 30 D 1910.

dance. Of these the most rare that I noticed were *Dryopteris filix-mas*, *Polystichum Braunii*, and *Dryopteris Goldiana*. One very beautiful frond of the Goldie fern, of a variety or form unknown to me, having unusually large and deeply lobed pinnules, was found growing at some distance from others of its kind. Unfortunately the rest of the foliage had in some way been destroyed, and only this one frond, a sterile one, remained.

Returning to the road through the field before mentioned, I stopped to dig up a few of the more abundant species for my fern bed at home. Among them was one which, not having at that time heard of the new hybrid, I took at first for a peculiar form of *Dryopteris marginalis*. True, its habit was upright and rigid, and the color not the usual bluish green. I fancied, indeed, that it had a faded look, perhaps from too great exposure to light, for it grew in the brightest sunshine, the hillside field facing southeast and being almost quite bare of trees. There was some difficulty in dislodging the thick rootstock from where it grew under a heavy pile of stones, but finally it was secured in good condition.

On my return to the hotel the large fern was temporarily planted in a box, and then at last I examined it carefully and found it to be no true *marginalis* but a hybrid.

Though not particularly graceful, it was nevertheless a fine, handsome plant. The fronds, about a dozen of them, were almost upright, growing in a circle, and bending only slightly outward. They were fully three feet high and ten or eleven inches broad. The color was a yellowish green on the upper part, somewhat lighter underneath. There were no sterile fronds, the upper half of each one being heavily fruited. The stipes, thick as a lead pencil near the rootstock, were rigid, very deeply grooved, and clothed with occasional brown scales. The veining seemed to resemble the *filix-mas*,

while the even rows of sporangia were so near the edges as to deceive me at first sight into thinking the plant a *marginalis*. Closer inspection, however, showed that they were not quite close to the margin and on some of the pinnules were halfway between margin and midvein.

I would have returned to that field for further investigation, but my stay at Barnard was drawing to a close and time failed me. Fortunately I recollected having seen other similar ferns scattered about, so my conscience was clear of having even inadvertently robbed the spot of a rare plant. About fifteen feet from where it grew I gathered some fronds of *D. filix-mas*.

On returning to Cambridge I took a frond of my find to the Gray Herbarium rooms at the Botanical Gardens, and Professor B. L. Robinson kindly looked into the matter for me and identified the fern as the new hybrid *D. filix-mas* × *marginalis*. The new station is only a few miles from the first one at North Bridgewater. The hybrid proved not to be an evergreen but turned brown and withered at the first touch of frost.

This spring the great round heads of the croziers, fifteen of them, appeared above ground in April, all thickly covered with silky bright brown scales. Now at the end of May, six of these are well up and uncoiling rapidly, the tallest measuring already twenty-nine inches. Their stipes can scarcely be seen through the dense covering of scales, their color is a bright green and all of the fronds are fertile. Two more fronds are just starting on their upward journey, while the remaining seven seem very loth to leave their snug winter bed to brave the uncertain warmth of our May atmosphere.

CAMBRIDGE, MASS.

Notes and news

Action has been delayed on the Sundry Civil Bill, and the appropriations allowed for scientific work are inadequate for a natural growth of our scientific institutions, resulting in a reduction instead of an increase in the staff of scientific workers. This is an unfortunate backward step in the line of scientific progress, the value of which the average politician does not see, especially at the time of exciting political conventions.

From Torreya we learn that Dr. Edgar W. Olive, professor of botany at the State College of South Dakota and state botanist, has been appointed curator at the Brooklyn Botanic Garden. He is to have charge of the department of public instruction and of the work in plant pathology.

The Rev. S. M. Newman, of Hagerstown, Md., has been elected president of Howard University, Washington, D. C.

Dr. A. J. Grout, editor of the Bryologist, is spending his summer vacation at Newfane, Vt., where he is making good use of his camera and studying nature at first hand.

Dr. O. E. Jennings of the Carnegie Museum is making a collecting trip in Canada in the interests of the museum.

Our secretary, Prof. L. S. Hopkins, is again spending a part of his summer vacation at Wooster, Ohio.

Mr. H. G. Rugg, our treasurer, is spending a part of the summer in the vicinity of Proctorsville, Vt.

A question box has been suggested by several members of the American Fern Society, but thus far no questions have been sent in. Will those who suggest a question box for the JOURNAL kindly make a beginning by sending in questions or suggestions to the editor?

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CONTENTS

Notes of a naturalist afloat—V . . William Edwin Safford 97
Roughing it to the Yosemite . . . . . H. Harwood Tracy 107
Further notes on the fern flora of Ohio
Lewis S. Hopkins 115
Outings for Onondaga moonwort and slender cliffbrake
H. E. Ransier 119
Whittier's herbarium . . . . . Harold Goddard Rugg 121
A suggestion on the field study of ferns . Philip Dowell 123
Notes and News 124
Index to Volume 2 125

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American Fern Journal

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Notes of a naturalist afloat—V

WILLIAM EDWIN SAFFORD

Santa Cruz

The Danish island of Santa Cruz, or Saint Croix, lies a short distance to the southeastward of Porto Rico, in latitude 17° 45′ North. Its surface is hilly, especially along its north coast, but the soil is very fertile and produces considerable sugar, while Santa Cruz rum is famous throughout the world. Though the climate is tropical it is tempered throughout at least eight months of the year by the trade winds, and it is only during the rainy summer months that the heat is oppressive. Though the island belongs to Denmark, English is the common medium of communication. The language spoken by the negroes, however, is a peculiar jargon which can scarcely be understood by an Englishman or an American new to the island.

The *Powhatan* arrived at Santa Cruz on the evening of February 23, 1882, having stopped for target practice on her way from Samana Bay, Santo Domingo. As we approached the island the deep sapphire sea changed to a turquoise blue and then to a lovely emerald green. We could not enter the harbor of Christiansted, or Bassin, on the north shore, on account of the shallow depth of its entrance, but we came to anchor on the leeward side of the island, about a quarter of a mile off shore from Fredericksted, or West End. From our anchorage the island was most picturesque, with its long curved

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coast line, suggesting the shore of the Bay of Naples, and its volcanic hills with their slopes covered with verdure, principally with patches of apple-green sugar cane. With our glasses we could make out a number of Spanish-looking buildings, with verandas and archways, surmounted here and there by plumy crests of palm trees; but on going ashore we were disappointed in the town. Most of the old masonry foundations bore flimsy wooden superstructures, many of them comparatively new and unpainted; for a great part of the town had only recently been rebuilt after having been burned by the blacks during labor riots, and many of the business houses and dwellings still lay in ruins.

Owing to the shortness of our visit and to my official duties on board ship it was not possible for me to do any systematic botanical work on the island; but I carried with me in the form of a small pamphlet a flora of the island by Baron Eggers, which had been recently issued by the United States National Museum.[1] With its aid I was able to determine the botanical names of many of the plants and fruits I saw, a great proportion of which were introduced species. Afterwards I added to my notes by consulting the collections made on the island by Professor A. E. Ricksecker and his mother in the years 1895–97. These are represented in the United States National Herbarium by nearly 1,000 numbers, and are referred to in detail together with those of Baron Eggers in Dr. Millspaugh's Flora of St. Croix.[2]

In the immediate vicinity of Fredericksted the country has not much of interest to offer a botanist. Many of the plants are cosmopolitan weeds, such as *Asclepias curassavica*, *Waltheria americana*, *Bidens bipinnata*,

[1] Eggers, Baron H. F. A. The Flora of St. Croix and the Virgin Islands. U. S. National Museum Bull. 13. 1879.

[2] Millspaugh, Charles Frederick. Flora of the Island of St. Croix. Field Columb. Mus. Publ. Bot. 1: 441-546. 1902.

Synedrella nodiflora, *Eclipta alba*, *Lantana camara*, and a number of Malvaceae and Leguminosae. Among the former are the yellow-flowered *Sida rhombifolia*, *S. ciliaris*, *S. carpinifolia*, *Malvastrum spicatum*, *Abutilon indicum*, and the common *Hibiscus vitifolius*. Among the leguminous plants were several low Cassias, one of which, *Cassia occidentalis*, is known by the not very pretty but very appropriate name "stinking weed." Indeed, many of the vulgar names applied to plants on the island of St. Croix and on other islands of the West Indies where English is spoken are brutally vulgar, and some of them can scarcely be presented in print. This is in striking contrast to the pretty names applied by the French, who have a tendency to euphemize unpleasant epithets. Thus, *Triumfetta lappula* and *T. semitriloba*, which on the French islands are called great cousin and little cousin, are here simply "bur-bushes"; and for *Poinciana pulcherrima*, so prettily named the flower of paradise by the Haitians, we have only "flower fence" or the remarkable name *dudeldu*. Some of the names are an amusing combination of English and Creole French, as "jackass calalu" for *Guazuma ulmifolia*, calalou being the general name in the French islands for all potherbs.

The strand flora of the island is very similar to that of all the Antilles. Here as elsewhere the coconut palm lends its peculiar charm. The sea grape (*Coccoloba uvifera*) attracts attention by its broad leaves and its inviting clusters of fruit. The latter is scarcely edible raw, but it is sometimes made into preserves. The coco plum (*Chrysobalanus icaco*) may easily be recognized by its glossy obcordate leaves and its pink-tinged, astringent, plumlike fruit. Other common strand plants are *Heliotropium curassavicum* and *Tournefortia gnaphalodes*. As elsewhere, the seaside convolvulus, *Ipomoea pes-caprae*, spreads over great areas of the

beach, with stems almost a hundred feet long; and near the beach are thickets of the prickly catsclaws (*Guilandina crista*) that bear the hard polished gray nickernuts.

On the rocky cliffs the vegetation is of a more xerophytic character, including species of *Agave*, Cactaceae, the thick-stemmed lactiferous *Plumeria alba*, belonging to the Apocynaceae, with large white jasminelike flowers; and *Jacquinia armillaris*, called baysallie or bracelet wood, which has evergreen glossy leaves, clusters of bright red flowers and yellow fruits, the seeds of which are strung into bracelets and necklaces.

The mangrove formations are composed of the same species as those noticed on the islands of Porto Rico, Hispaniola, and on the Florida Keys. Farther inland, growing in moist situations, occur *Bucida buceras*, here called gregry, which yields valuable timber; and *Annona palustris*, the fruit of which is here called monkey apple and is used as a bait for mangrove snappers and other fish.

In dry situations the vegetation is often composed of scrubby bushes including several species of *Croton*: *Croton flavens*, called maran; *Croton flavens rigidus* called yellow maran; *Croton astroites*, called white maran; and *Croton discolor*. These plants yield a bitter aromatic bark very much like cascarilla and the copalchi bark of Mexico, and are used for the same purposes. The common maran may possibly be derived from cascara mariana, or cascara de Santa Maria. In Porto Rico, where the name Santa Maria cimarrona, or wild St. Mary's bush is applied to *Croton flavens rigidus*, the plant is used medicinally, and the young twigs are used in baths. Other plants growing in dry situations are the sweet-scented *Acacia Farnesiana* and the closely allied *A. tortuosa*, here called cashew, species of Cactaceae and other forms similar to those growing in the southwestern portion of Haiti.

As in most countries that have a distinct dry and rainy season, certain shrubs and trees are deciduous. Among them are *Annona squamosa; A. reticulata; Ceiba pentandra*, the silk-cotton tree, which sometimes attains gigantic proportions; *Hura crepitans*, the sandbox; *Spondias lutea*, the hog plum; *Sabinea florida*, a leguminous tree somewhat like our *Robinia pseudacacia; Erythrina corallodendron*, the coral tree; and *Poinciana regia*, the flamboyant.

Among the evergreen species are the glossy-leaved *Annona muricata;* the monkey apple, *A. glabra;* the Santa Maria, *Calophyllum calaba*, distinguished by its beauitful fine-veined leaves; several species of Sapotaceae, including the sapodilla, which is here called mespel, and the star apple (*Chrysophyllum cainito*); and among the Rutaceae, in addition to the ordinary citrus fruits, the orangeberry (*Triphasia trifoliata*), which is well adapted for hedges and often forms dense thickets, and the so-called jumbee apple (*Tobinia punctata*).

Climbing in the hedgerows and thickets are *Passiflora foetida*, the greenish flowers of which have a finely divided calyx like the common love-in-a-mist; *Clitoria ternatea* with deep blue pealike blossoms; the tobacco-pipe vine (*Aristolochia trilobata*) and crane's neck (*Aristolochia anguicida*); the Asclepiadaceous *Metastelma Schlechtendalii;* and a number of Convolvulaceae. Among the climbing plants of the forests are species of *Serjania, Bignonia, Cissus*, and *Philodendron*, similar to those on Porto Rico and Hispaniola; and perched upon the limbs are a few orchids, several Bromeliaceae, and several epiphytal ferns.

Beneath the trees herbaceous plants are not so abundant as in most of the other islands of the West Indies. Several species of *Piper* and *Peperomia* occur, associated with a few mosses, lycopods, and ferns.

One of the best regions for ferns is the Crequis Valley,

which reaches the coast about two miles north of Frederiksted. In this valley there is an enormous silk-cotton tree (*Ceiba pentandra*) regarded with superstitious reverence by the negroes, who call it the jumbee tree and resort to it to practice the rites of the Obeah worshippers. Through the bottom of this valley flows a perennial stream, here called a "gut," a most offensive word to my ears. Among the ferns growing here are several species of *Dryopteris*, *Blechnum occidentale* and *Adiantum fragile*. Near the crest of Mount Eagle, about 1150 feet high, occur *Adiantum villosum* and *Polypodium phyllitidis*. The pretty silvery fern *Ceropteris calomelaena*, the delicate maidenhair *Adiantum tenerum*, and *Pteris longifolia* occur here and there on old damp walls. The golden fern, *Ceropteris sulphurea*, is sometimes seen in cultivation; and the interesting strawberry fern, *Hemionitis palmata*, which propagates itself by buds from the serratures of the fronds, occurs in patches in the shady forests, in dry rocky soil, as at Eliza's Retreat. In dry, xerophytic situations, the only fern thus far collected is *Cheilanthes microphylla*. *Polypodium Swartzii* (*P. serpens* Baker) climbs shrubs and trees on rocky hills; *P. polypodioides* (*P. incanum*) occurs among the roots of large trees, and the widely spread *P. aureum* on rocks and dead trees in the forest; and *Dryopteris tetragona* is not uncommon in the woods. *Blechnum occidentale* is frequent both in the woods and in pastures, and *Nephrolepis biserrata* grows here as elsewhere on the trunks and limbs of trees. Another allied species, locally known as the princess' feather, is *Nephrolepis exaltata*, one of the favorite ferns for pots and hanging baskets. In marshy places occurs the widely spread *Acrostichum aureum* (*Chrysodium vulgare* Fée), which grows in similar situations throughout the tropics of both hemispheres. No Hymenophyllaceae have thus far been collected on the island of Santa Cruz.

The fruits of the island are plentiful and of good quality, though very little attention is paid to their cultivation. I was told that in the houses of nearly every family fruit appears on the table three times a day, and that there is no time during the year in which it is lacking, though the mangos, oranges, and breadfruit have certain definite seasons. Lemons and limes are produced continuously, and one sort of fruit replaces another in rapid succession. Guavas (*Psidium guajava*) are very common and make excellent jelly and preserves. In some places guava bushes cover large tracts, like those I afterwards saw on the island of Hawaii and elsewhere, often struggling with such weeds as *Lantana camara* and the sensitive plant (*Mimosa pudica*) for supremacy. The so-called "cherries" of the island, pretty, bright red little fruits, proved to be *Malpighia glabra*. The "plums" were species of *Spondias*, belonging to the Anacardiaceae, the family to which our sumacs and the mango belong. *Spondias lutea*, with yellow fruit, is called hog plum; while *S. purpurea*, with purple fruit, is here known as the Jamaica plum. Another fruit of this family is *Anacardium occidentale*, here called cashew, its fruit known as the cashew apple, is merely the enlarged pearshaped fleshy receptacle, at the extremity of which is borne the kidneyshaped cashew nut. This has a rich oily kernel, but its shell must be carefully removed, as it is so acrid as to blister the skin.

Among the Annonaceae are several that bear edible fruits. The soursop (*Annona muricata*) has a heartshaped fruit often as big as a child's head, with a smooth green skin bearing soft prickles and with white fleshy pulp of a pleasantly acidulous taste. This makes excellent jelly and preserves; but the ill-tasting skin must be removed before the fruit is ready for the table. The fruits appear enormous when compared with the size

of the tree, which is often no larger than a peach tree, and they grow sometimes directly out of the trunk or the bark of the older limbs as though the branches could not bear their weight. Another popular fruit is the sugar apple (*Annona squamosa*) with pulp like sweet creamy custard. It is often planted near houses and produces several crops a year. The bullock's heart, or common custard apple (*Annona reticulata*), is less popular with the islanders. When ripe it is usually reddish and solid with its surface covered with impressed reticulated lines; while the sugar apple is at first glaucous green and then yellowish with its surface divided into easily separable tubercles corresponding to the individual carpels composing it.

Pineapples of excellent quality are produced. In many places they appear to grow spontaneously. The wild pineapple or pinguin (*Bromelia pinguin*) with stiff sharp-pointed leaves armed with stout marginal spines is used in hedges. It certainly forms an impassable barrier. Another plant of the same family, also called wild pine, is *Tillandsia utriculata*, usually perched upon trees or rocks, with the inflorescence in the form of a loose pyramidal panicle of greenish flowers, sometimes 2 meters high. *Tillandsia usneoides* and *T. recurvata*, called old man's beard, are also common on limbs of trees and shrubs; the latter is sometimes used for stuffing mattresses and cushions. The introduced *Aloe vulgaris* forms broad patches in dry limestone situations and is locally known as "sempervivie" (from the Spanish *siempre-viva*). The so-called American aloe (*Agave sp.*) also occurs and is here known as karatá, while a species of *Fourcroya* is known as the female karatá on account of the bulblets borne by the branches of its inflorescence.

Among the edible roots and tubers are the sweet potato (*Ipomoea batatas*), yams (*Dioscorea sativa* and *D. alata*), *Xanthosoma sagittaefolium* called tanier, and *X.*

atrovirens which is appropriately named "scratch-throat" on account of its irritating microscopic needle-like raphides.

On one of my excursions I visited the estate of a Mr. Roberts, situated a short distance to the northward of Frederiksted, where I was most cordially received and was entertained with some interesting stories, the most thrilling of which was an account of the stranding of the United States Ship *Monongahela* by a great tidal wave. The catastrophe occurred on the afternoon of Nov. 18, 1867. The ship was lying off the town very near where our ship had anchored, when suddenly a severe earthquake shock was felt and the vessel was lifted up by a great wave and carried completely over the tops of the warehouses near the shore into one of the streets but came back with the returning sea and was deposited on an even keel at the water's edge. Fortunately only five of her crew were lost, and she sustained so little injury that it was possible to relaunch her about six months later. In the meantime one of the officers who remained attached to her, Lieutenant Commander (afterwards Rear Admiral) Harrington succeeded in winning the hand of one of the most attractive young ladies of the island; and it was here also that Rear Admiral Howell found his bride.

The following year, on Aug. 13, 1868, while the *Powhatan* was flagship of the South Pacific squadron, she herself narrowly escaped a similar experience in the harbor of Callao, when a similar wave swept the Peruvian coast. This completely destroyed the store ship *Fredonia*, anchored off the town of Arica, and carried the United States Ship *Wateree* 500 yards inland leaving her high and dry on the sandy plain. I have often heard the story telling how the commanding officer ordered the purchase of several mules for the convenience of traveling back and forth from the neighboring town. The lower booms of the ship were rigged out and the pendants

to which the ship's boats were usually secured were utilized for hitching the mules. One of the latter was christened by the sailors the "Captain's Gig;" another was the "First Cutter," for the use of the ward-room officers, and so on; and when the captain or an officer wished to leave the ship the boatswain's mate would give a blast on his whistle and call out, "Away the Gig!" or "Away the First Cutter!" whereupon a sailor would run out on the boom, descend by the Jacob's ladder to the ground and bring the gray or the white mule around to the foot of the starboard gangway ladder. After a careful examination of the *Wateree* it was deemed inexpedient to attempt to relaunch her, and she was accordingly sold.

Mr. Roberts gave me some delicious sherbet made from the pulp of the fruit of a passion flower (*Passiflora laurifolia*) here known as the bell apple. He gave me a list of the principal island fruits, among which in addition to those already mentioned were the kenep (*Melicocca bijuga*), the breadfruit, the mango, the mammy apple or mummy apple (*Mammea americana*), the alligator pear (*Persea gratissima*), which the English officers sometimes call midshipmen's butter; the papaw (*Carica papaya*), the leaves of which are said to make meat tender; and the common calabash tree (*Crescentia cujete*), which yields gourdlike kitchen utensils. The pods of the acacialike tamarind tree contain an acidulous pulp from which a refreshing and wholesome drink is prepared. The tamarind is an admirable shade tree with its broad spreading branches. Another handsome shade tree is *Pithecolobium saman*, and on this island I saw for the first time mahogany trees planted along the roadside for shade.

In recalling the negro uprising of 1878 Mr. Roberts told me of the terrible atrocities committed by the blacks, and of how messengers were sent to the outlying plantations to warn the planters of the impending danger. I

was much impressed with the names given to some of the plantations on the island; such as, "Anna's Hope, Peter's Rest, Judith's Fancy, Parasol Hill, Jealousy, Rustup Twist, Eliza's Retreat." They suggested a romantic early history, and they recalled the story of Paul and Virginia and their lovely tropical island on the opposite side of the globe, where many of the same trees and fruits and ornamental plants must have grown as those on Santa Cruz. Many of these local names are perpetuated on the labels of collections in the United States National Museum, especially among the specimens collected by Mrs. Ricksecker and her sons.

On my taking leave of Mr. Roberts he gave me a few bulbs from his old garden, including those of a white spider lily (*Hymenocallis caribaea*), a handsome red amaryllis (*Hippeastrum equestre*), and the beautiful little *Zephyranthes rosea*. Although these were in bloom at the time, they were not injured by being torn up. I dried them and at the end of the cruise took them home, where for many years they continued to bloom in my mother's garden, though they had to be taken up each year and protected through the winter.

The following evening we weighed anchor and steamed to the southeastward, bound for the French Island of Guadeloupe.

Roughing it to the Yosemite

H. HARWOOD TRACY

Many of the members of the Fern Society who live within easy reach of the woods or the mountains may find it hard to realize the feeling that a lover of ferns must have when he is situated so that he can not see a fern growing in its native haunts without a trip of over 35 miles, and that trip over hard roads. This has been my experience for the last two years, and so it was with

a great deal of anticipation that I began to make my plans for a camping trip into the Yosemite and possibly the higher Sierras. I had had the good fortune of having visited the wonderful valley once before, but that time I was not permitted to do the clambering around that a fern collector so enjoys. But upon this trip I planned to go in such a way as to secure the most outdoor recreation possible and to see the mountains as intimately as any one could in a short two weeks.

In company with three of the boys of our high school I set out on the 29th of June with a "light pack." As we started out just at sunrise we certainly made a spectacle; two little mountain horses, a one-seated light road wagon, our "grub box" nailed on the back of the one seat, a couple of blankets folded up for a cushion for the grub box, two boys on top of the box, my botany press in front, which with a pack saddle made a convenient place for our feet, and we were off.

The first thirty miles were mainly uninteresting to us, first past the various fruit orchards, peaches and apricots just beginning to ripen, then past the wide expanses of green alfalfa, on the straight road to the mountains, the road ever in front of us without a turn. Past the wheat fields, first in quarter sections then in full sections and later the many sections where the thirty-six mule team threshers and reapers were at work. Twenty-nine miles without a hill to climb, and then we met our first hill, only a little one, but it looked steep to the boys, who immediately jumped off to lighten the load; many a worse one did we all ride before we reached the Yosemite.

Reaching the little town of La Grange we put our horses in the stable and ourselves in the hotel, for we were not anxious, especially myself, to try our hand at cooking; I was to do that part of the camp work. After eating a hearty dinner we started to walk to the La

Grange Dam, which is the beginning of the Turlock and the Modest Irrigation districts, together making one of the largest tracts of irrigated land to be found in the United States. On the way there, I was to see my first ferns. The very common gold-back, *Gymnogramma triangularis*, was at this altitude (600 ft.) and season dry and curled up. Passing along the banks of the Tuolumne River up towards the dam, I came across *Azolla filiculoides* growing abundantly at the base of a spring. The plants literally covered the pool of water, and that seeming not to be enough they encroached on the ground, growing in the damp soil around the spring for a distance of many feet. The plants were in excellent condition both as to abundant fruiting stages and luxuriance of growth.

Under the protection of a large rock near the dam, where the wind carried the spray, I found several plants of *Gymnogramma triangularis viscosa*. I have seen this plant growing near San Diego, Calif., but I was surprised to find it here and later in the Yosemite Valley. *Pellaea ornithopus* and *Woodwardia radicans* were also seen growing near the falls. One other little fern was also found here, *Pellaea densa*. This fern I had expected to find up in the mountains, but I had hardly expected to see it growing at this low altitude.

After a survey of the irrigation flumes and dam we hurried back to our wagon and started on. The country became hilly and the roads winding, but on the hilly plateau only vast fields of wheat were found, or if the country was too hilly, with frequent outcrops of rock strata, the land would be fenced in for pasture use, now abandoned for the greener country farther up in the mountains.

Our horses had traveled 32 miles in the morning, and the hilly country soon showed them to be tired, so we pitched our camp, which consisted of unrolling our blankets and getting a fire started under a pot of coffee

and a pan of beans. Sleep was rather intermittent this first night out, for we were not yet in the land of hemlock or even pine boughs for beds. Securing an early start the next morning we hurried along and slowly began to ascend, and with the ascent the hills became more and more covered with trees. First only an occasional oak, then larger and larger groups of them together with buckeye bushes. Before noon we had passed thru a few groves of jack pines, and we saw ahead of us chain after chain of low mountains (3,000–4,000 ft.) covered with a good forest growth.

Arriving at the old-time town of Coulterville about noon, we rested for a while, and then almost leaving civilization behind we took the old Coulterville road for the Yosemite. Occasionally we found a little water in the creek beds, and the country became more and more mountainous, but ever with higher mountains ahead. A few specimens of the gold-back were seen along the road as well as the "tea fern," *Pellaea ornithopus*, and when we found a cool shaded spot where the water was abundant, there was *Woodwardia radicans*, and the hillsides were covered with the common *Dryopteris rigida arguta;* but little else did we see in the fern line until we had reached the Yosemite. I have disregarded one fern, so common and so abundant did it grow, *Pteridium aquilinum pubescens* Underw. The plants of this were so much easier to gather than boughs, that we made our beds of them each night.

The afternoon of the third day we reached the highest point on this road, 6,000 feet, and by evening we had reached the Big Meadows, a point 17 miles from the center of the Valley. From this point into the Yosemite was a gradual down grade with the exception of the last two miles, when you drop between 1,500 and 2,000 feet. And such a road. Almost sheer rock, where even the sliding of the wheels will not hold your wagon

By 8 o'clock we had successfully descended this grade, and there, only a few feet below us rushed and leaped the Merced River. At this point I found another specimen of the silver back, *Gymnogrammâ*, and also *Cheilanthes gracillima* and *C. Fendleri*. *Pellaea ornithopus* was also abundant.

By noon we had reached our final destination and had pitched camp. On the following morning we took the trail for Glacier Point. The so-called "long trail" being 14 miles in length, most of the tourists ride mules or horses, but I had had experience that way and I decided I wanted to hurry at one time and stop at another, and according to my experience the former, at least, was not possible with a mountain mule. Taking what is known as the "ledge trail" to the foot of Vernal Falls, I found *Polystichum munitum* growing very abundantly. In a secluded corner, where the spray from the falls furnished plenty of water, was a beautiful grotto filled with *Adiantum pedatum*. Prof. Hall, in his admirable little book, Flora of the Yosemite, says that this fern once was the most common of any in the valley, but the admiring tourists so uprooted the plants that they are now found only in a few places well out of the reach of the easily wearied pleasure seeker. I am glad that there are these few places, three of which I found. Beside the one already mentioned there is one, the largest that I saw, upon the left as one is climbing the trail that leads to Tenaya Lake, ascending the mountain just above Mirror Lake. One visiting the Yosemite would be well repaid to take this trail up far enough to gain a view of this lovely grotto. It will be there when you go, for it is well out of reach of any but the most daring. Another smaller group was seen on the "lightening" or "ledge trail" to Glacier Point. This grotto is well guarded, for the authorities of the park will not allow this trail to be used with their permission, since

two young men lost their lives while climbing it. However this may be and while it is not as easy as the other trails in the park, yet if you are a fern lover and can only take one trail, take this. The reason for this advice I will give later.

Pellaea densa and *P. Bridgesii* were found along the trail to Glacier Point. The last named one, like others of the genus, seems to delight in being choked or in living upon a very meager diet. Rocky cliffs with only a crevice seem to be its especial joy. This fern has always been a trial to me, for I can not make a pressed specimen look neat. The little pinnae are so brittle,and when found are often so twisted out of natural shape that it is a difficult task to get them into the press in any kind of shape. Mr. L. S. Hopkins had asked me to watch out for *Filix fragilis* and to collect some for him at various altitudes, watching for the highest altitude. I had thought it confined to altitudes between 2,500 and 6,000 ft., but on this trip I found it much higher, growing above Glacier Point and up toward Sentinel Dome at 7,900 ft. Upon Sentinel Dome, where the wind is so strong that the single pine tree grows to the southeast instead of upward like the rest of its kind, we found *Cryptogramma acrostichoides*. The little fern has always interested me, for while there are other dimorphous ferns accredited to California and occasionally found. this little fern is so abundant in its territory that it is a pleasure to meet it.

Polypodium species, which are abundant in so many places, seem to have left out the Yosemite district. *Polypodium californicum* grows very abundantly in most mountainous regions of the State south of San Francisco, but not a specimen have I seen in the Yosemite region, and the common eastern *P. vulgare* occurs rarely in California. It has been found, so far as I know, in only one place in the Yosemite, up high in a crevice

of rock at the foot of the Yosemite Falls. Four years ago I gathered a few at this place, and this year I found even less growing there, so I left them, just noting that they were there. Prof. Hall, in Flora of the Yosemite, speaks of collecting this fern in this same place.

One trip, which lost us two days of time and which resulted in a disappointment, was our journey to Lake Tenaya. It was a disappointment in that I expected more than we realized, and in that we were driven out by those "demons" of the high mountain regions, the mosquitoes. I think we might have stood them, but the horses could not protect themselves and were nearly crazed. One horse was white when traveling in other places but in the Lake region she became very dark gray, so completely covered was she by the mosquitoes.

Upon this trip we reached our highest altitude, 8,900 ft., and just on one side of this point was growing most luxuriantly *Cryptogramma acrostichoides*, and with it *Filix fragilis*. No other fern of interest was seen on this trip unless it was *Pellaea ornithopus*-*Wrightiana*. I run these two names together, for I certainly saw almost every stage intermediate between the types of both, and some bordered on the *P. brachyptera*. In reading Prof. Hall's account of the same species I was glad to note that he had felt the same way, that it is impossible to draw a line between the two species, at least as they are found in the Yosemite.

Now I want to tell why I advised anyone who had only a short time in the valley to take the "ledge trail" to Glacier Point. After looking over Prof. Hall's Flora, I found that he had collected *Woodsia scopulina* upon this trail. It was my last afternoon in the Yosemite, but I did want to see that fern. The trail is very indistinct in many places, as it leads over sheer rock for hundreds of feet at times. Once I thought that surely I was climbing the Alps, as with knees pressed against

the sides of a crevice of the rock and fingers clutching a half inch notch in the side of the rock I worked my way up to find myself many feet to one side of the trail and nothing else possible but to go back the way I had come. One thing rewarded me for the sore knees and raw finger tips, the finest specimens of *Cheilanthes gracillima* I ever saw. Many of these specimens measured the limit set by Underwood, and some exceeded it, stipes 11cm. and fronds 14cm. long.

Without going into further detail of this climb let me enumerate the ferns seen or collected on this climb, which consisted of a rise of 2,500 ft., almost straight up—but with only a few very dangerous places if you can keep to the trail.

The ferns are as follows: *Pteridium aquilinum* (L.) Kuhn, *Pellaea Bridgesii* Hook., *P. densa* (Brack.) Hook., *P. ornithopus* Hook., *P. Wrightiana* Hook., *Filix fragilis* (L.) Underw. *Adiantum pedatum* L., *Cheilanthes myriophylla* Desv., *C. gracillima* D. C. Eaton., *Cryptogramma acrostichoides* R. Br., *Polystichum munitum* (Kaulf.) Underw., *Dryopteris rigida arguta* (Kaulf.) Underw., *Asplenium filix-foemina* (L.) Bernh., and the object of my climb, *Woodsia scopulina* D. C. Eaton. Fourteen distinct kinds and many of them the finest collected upon the whole trip. Wouldn't that entice you to make the trip? It would me, again.

Although I was unable to reach the very hiighest Sierras and although we were driven back from Lake Tenaya, yet with my twenty-one species and varieties of ferns and the many good times I feel well repaid for my trip.

CERES, CALIF.

Further notes on the fern flora of Ohio

LEWIS S. HOPKINS

In order to bring it up to date, some corrections and additions to the Fern Flora of Ohio* are necessary. Of *Botrychium lunaria* L. it was said; "reported from Lake Co." This species was so given in a checklist issued by the Ohio State University. In the new Gray's Manual it is credited to "northern Ohio." However, there are no authentic specimens to verify the report, so that for the present, at least, it must be excluded.

BOTRYCHIUM DISSECTUM Spr. This species occurs sparingly throughout the state. Intermediate forms occur quite often.

OSMUNDA CINNAMOMEA AURICULATA Hopkins. Although of no great significance, this form is included since it was collected at Thompson's Ledges, Geauga Co., in August 1911.

ADIANTUM PEDATUM LACINIATUM Hopkins is a cut-leaved variety of the common maidenhair, found in Wayne Co.

CYSTOPTERIS FRAGILIS CRISTATA Hopkins occurs at Woodworth's Glen, Portage Co.

DRYOPTERIS CLINTONIANA (D. C. Eaton) Dowell was given as occurring only in Wayne County. It has since been collected by the writer in Geauga County. There is a possibility that some of the Geauga County specimens may be *D. cristata* × *Goldiana* R. C. Benedict. However, further study will be necessary to determine this point.

DRYOPTERIS CLINTONIANA × SPINULOSA R. C. Benedict occurs sparingly at Fox Lake and Brown's Lake,

* The Fern Flora of Ohio. Fern Bulletin **15**: 1. Ja 1907.

both in Wayne County. I have collected it at each place.

It is quite likely that other *Dryopteris* hybrids will be found in the northern part of the state within the next few years.

DRYOPTERIS CRISTATA × INTERMEDIA Dowell [*Dryopteris Boothii* (Tuckerm.) Underw.] has been collected rather plentifully by the writer in Wayne and Geauga counties. It probably occurs in other northern counties as well.

DRYOPTERIS CRISTATA × SPINULOSA (Milde) C. Chr. occurs plentifully at Brown's Lake, Wayne Co., where it has been repeatedly collected by the writer.

DRYOPTERIS DILATATA (Hoffm.) Gray. Of this species Schaffner* says: "The form *D. spinulosa dilatata* (Hoffm.) Unde., with broadly ovate or triangular-ovate, commonly three-pinnate leaves has been found by Hopkins in Tuscarawas county."

However, this is not true *D. dilatata* and it is my own belief that this species does not occur in the state.

DRYOPTERIS INTERMEDIA × MARGINALIS R. C. Benedict. A single plant was found at Brown's Lake, Wayne Co., from which two fruiting fronds were secured. The plant itself was sent to Mr. H. G. Rugg at Hanover, N. H.

DRYOPTERIS MARGINALIS ELEGANS J. Robinson was first collected in Mahoning County by E. W. Vickers. I have collected it in Wayne County. In Ohio, at least, it is a very pretty form and is well worthy of its name. It probably occurs throughout the state.

EQUISETUM PRATENSE Ehrh. The occurrence of this species is extremely doubtful as the specimens which have been so named are probably to be referred to another species.

EQUISETUM SYLVATICUM L. occurs plentifully at one

* Schaffner, J. H. Proc. Ohio Acad. Sci. **5**: 286. 5 Ja. 1910.

station, near Burton, Geauga Co., in addition to Auglaize and Wood counties, as previously listed.

EQUISETUM FLUVIATILE L. is "not common but to be found in most parts of the state in suitable habitats." I have collected it at Navarre, Stark Co., and at Wooster, Wayne Co., where a fine colony is to be found only a few rods from the B. & O. railroad station.

EQUISETUM LAEVIGATUM A. Br. is referred to as "general but apparently not common in Ohio." The only place where I have found it is within the city limits of Massillon, Stark Co., where it is to be found along the canal banks north of Main Street.

EQUISETUM HIEMALE L. While the specific form itself may occur in the state, I have seen no material that could be properly classified as such. The varieties *intermedium* A. A. Eaton and *affine* (Engelm.) A. A. Eaton are probably general in their distribution throughout the state.

LYCOPODIUM INUNDATUM L. was the victim of one of the accidental discoveries more often read about than occurring. While I was exploring Woodworth's Glen, Portage Co., some two or three years ago in company with some friends, the little valley which we were ascending narrowed down abruptly, the walls became almost perpendicular, and the little stream which occupied the entire bed of the tiny canyon was in places two or three feet deep. Clearly it was a case of wading the stream for some distance or missing the exploration of a most inviting little canyon. I chose the former while my companions went around. With shoes removed and trousers rolled up to the high-water mark of my boyhood days, I proceeded to have a delightful wading party all of my own. After more than an hour of this juvenile but highly exhilarating performance I returned to the starting point and sat down on a bowlder to replace my shoes. Only the botanist knows the thrill of pleasure

experienced when I perceived within a few inches of my shoes a small colony of the bog clubmoss growing upon a damp moss-covered bowlder. The fruiting plants, two or three in number, were collected and subsequently sent to the State Herbarium at Columbus. So far as is known, this is the only authentic record of its occurrence in the state. A visit to the same place last August revealed the fact that the entire colony had been completely obliterated by the floods occasioned by the heavy rainfall of the preceding spring and summer.

LYCOPOPODIUM SELAGO L. A plant referred to this species was described in the April number of this publication. As to whether or not it is *L. selago* depends upon one's point of view. According to the revised Gray's Manual the fundamental difference between *L. selago* and *L. lucidulum* is that in the former the leaves are uniform in length while the latter has the "leaves in zones, alternately longer and shorter." The plant in question has zones in which both kinds of leaves are of the same length; also on the same stem zones of alternately longer and shorter leaves; it also has some sporophylls longer than some vegetative leaves, a characteristic which, so far as I know, never occurs in *L. lucidulum*. If we adopt this view it might be *L. selago* or *L. lucidulum*, neither one, or a hybrid between the two.

Prof. Schaffner* regards *L. porophilum* as entitled to a specific rank and would make the fundamental difference between it, *L. lucidulum*, and *L. selago* depend upon the method of branching. Since a single specimen of the plant under discussion shows practically all of his three methods of branching, it again might with equal justice be called either or neither with the same suggestion of hybridity.

* Ohio Nat. 12: 499. 1912.

Lloyd and Underwood* make the distinction between *L. selago* and *L. lucidulum* depend upon the fact that the former has hollow leaf bases while the latter does not. So far as I have been able to find out, all descriptions of *L. selago* say that it has hollow leaf bases while all are equally well agreed that no other *Lycopodium* has such a characteristic.

Therefore, since the Dundee specimen has hollow leaf bases, I have chosen to call it *L. selago* and shall continue to do so until convinced of my error.

In connection with the identification of this plant it may not be out of place to state that before it was published as *L. selago* live specimens were sent to three of the largest institutions in the United States and that all were uniformly too busy to venture an opinion as to its identity.

MARSILEA QUADRIFOLIA L. is "occasionally cultivated and found as a waif in Franklin Co."

SELAGINELLA RUPESTRIS (L.) Spring. I have collected this in the gorge of Paint Creek in the extreme eastern edge of Highland County. It has also been collected in Licking, Fairfield, and Hocking counties.

SELAGINELLA APUS (L.) Spring occurs in Lake and Trumbull counties.

PEABODY HIGH SCHOOL,
PITTSBURGH, PA.

Outings for Onondaga moonwort and slender cliffbrake

H. E. RANSIER

It was toward the close of a busy day of botanizing in the fall of 1908, showing a visiting enthusiast and Fern Society member the wonders of the Scolopendrium

* Bull. Torrey Club 27: 149. 1900.

Lake region, that we were hurrying toward the best station for the Onondaga moonwort fern, where our friend hoped to collect a few choice specimens. The usual route by sheep paths and wood roads was too round about to suit our inclinations, so we decided to attempt a short cut, directly up the face of a cliff.

It was hard climbing to the top of the talus, and the wall above was forbidding.

A favorable spot for scaling the top was found, and as we were wriggling over the topmost layers of limestone, my friend called attention to a fringe of dead fronds hanging for a long distance along under the topmost rocks, which overhung the crevice by a foot or so. It was unmistakably slender cliffbrake, and a very promising station for it, fully a mile from the only reported station near Green Pond.

The following season I was anxious to visit the station, and when I did so I approached from the top of the cliff. While the fern was located in abundance, that original place where it was first espied has to the present time eluded me. It grew in little banks, one frond overhanging another so thickly that nothing else was visible where it had a foothold. It was found for some distance along the face of the wall, which faces the northwest, and seemed even to be doing well on the sides of an old charred stump, which retained a foothold there.

One sultry afternoon later in 1909 another trip was made to visit the station. A kodak, a small tin collecting case, etc., were taken, and after spending some time at the moonwort station, I proceeded on over the bare, crumbling rock mass that forms the greater part of the top of the cliff, stopping only to enjoy the splendid view, which includes Manlius to the east and Fayetteville to the north, each but a couple of miles away. When I was about 100 feet above the surrounding country, a couple of small lakes were at my feet and the panorama

included plenty of woods and fields, and hilltops far away.

Turning to go on my way, I saw a tall figure coming toward me from the west along the top of the rocks. He was something over 6 feet tall, 25 or 30 years old, apparently, would weigh 190 lbs. and was dressed "roughing it." As we met in this wild, deserted, barren spot he greeted me with "Taking pictures?" "Nope," I replied, "haven't even put in a film yet; I'm botanizing." "So am I. My name is Benedict." "Ever have any correspondence with a fellow named Ransier?" Upon his replying that he had, I said "Well, I am Ransier!" It was a most unexpected meeting and we proceeded to make the most of it, comparing specimens, then repairing to a couple of stations for rarities, the moonwort, which he had never collected before, and the slender cliffbrake, both of which were within a very short distance of us. At first I was afraid to reveal the home of the moonwort to him, but I sized him up as safe to trust the secret to, and he has not disappointed me. Of course, we both wanted the floor at the same time occasionally, but he had an appointment in town, and it was soon "goodbye" and only a sight of him once since, but neither will ever forget the pleasure the day brought us.

MANLIUS, N. Y.

Whittier's herbarium

HAROLD GODDARD RUGG

This last spring, in looking over an auction catalog of books to be sold in New York City, I spied a notice of an album of ferns formerly belonging to John Greenleaf Whittier, the Quaker poet. I was fortunate enough to secure the album, a description of which may be of some

interest to members of the American Fern Society. The album is a large, nearly square book, in color blue, stamped with gold design, an album such as was used years ago by collectors of pretty advertising cards. On the inside cover is a book label reading: "From the library of John Greenleaf Whittier, Amesbury, Mass., sale authorized by Samuel T. Pikard, literary executor, Jan. 1903." On the opposite page appears the autograph of the poet himself: "John G. Whittier, Amesbury, Mass." .

Some of the ferns, all of which are from California, are determined and their names written in the poet's hand beneath the mounted specimens. No labels were used. Among the specimens as determined by Whittier is the gold-back fern from San Diego County, California, silver-back fern from the same locality, a *Cheilanthes*, coffee fern from Alum Rock, Santa Clara County, birdfoot fern from Mt. Hamilton, Calif., *Davallia dissecta*, Santa Barbara, Calif. As the last fern is not native to California this frond came evidently from some greenhouse or other collections. Several of the ferns are not determined. Among these are evidently another variety of *Cheilanthes* from Southern California and a maidenhair from the Santa Cruz Mountains. The book contains also some everlastings and grasses from Lake Tahoe and four unnamed ferns without locality. Among these are a *Polypodium*, an *Asplenium*, probably *Asplenium vespertinum* and *Cystopteris fragilis* (L.) Bernh.

I do not find from biographies of Whittier that he ever visited California, so undoubtedly these few ferns were sent or brought him by some botanical friend.

HANOVER, N. H.

A suggestion on the field study of ferns

PHILIP DOWELL

At least in America, the fern student need not as yet resort to the mere naming and describing of forms, even though he may profitably study forms or variants and write about them. It is well for the botanist to become so thoroughly acquainted with species of plants that he can readily recognize certain forms or variations, but it is not necessary nor even desirable that he give a scientific name to each of the multitudinous forms he learns to recognize.

The suggestion of another field of activity will be sufficient to attract the attention and the efforts of many students who are favorably situated for carrying on the work. I have in mind especially the time of fruiting of each species. Records should be definite, giving at least the actual date when the spores first ripen, also as nearly as practicable the time when the spores have been all discharged. In connection with this study, the student may be in a position to make various other observations and records: such as the time of appearance of the plant at the beginning of the growing season and the time of its withering at the end of the season, behavior under varying ecological conditions, distribution of species, etc. Such records from different observers in various sections of the country constitute valuable material for publication, especially if the records extend over observation periods of more than one season for the same species.*

PORT RICHMOND, N. Y.

*Further suggestions may occur to the reader by reference to H. W. Pretz's Flora of Lehigh County, Pennsylvania—I. Bull. Torrey Club 38: 45–78. 7 Mr 1911.

Notes and news

This last September I had the pleasure of visiting Miss Corne's station in Barnard, Vt., for *Dryopteris filix-mas* (L.) Schott. It is interesting to note that here the plants grow in land sheltered and protected by butternut trees. This is true of the plants at Miss Strong's station in Woodstock and Bridgewater. I collected small fronds in fruit and shall be glad to send a frond to each member of the society for postage.

I also found a very large clump of the hybrid *D. filix-mas* × *marginalis*.

Do members of the Fern Society know that the young, tender, uncoiled fronds of *Pteris aquilina* L., our common brake, when cooked are used as greens by many? This last spring I was fortunate enough to be treated to a dish of the greens, which are very palatable. To some, however, the taste has to be acquired. Campers in the woods and lovers of wild foods, may be glad in May and June to avail themselves of this opportunity for a new dish.

H. G. Rugg.

Substantial contributions to the society's herbarium to the number of about 125 nicely mounted sheets have been made by Dr. D. W. Fellows of Portland, Me., Mr. J. R Swinerton of Newport News, Va., and Mr. H. C. Bigelow, New Britain, Conn. Several other donations have been promised and will probably be received in due time.

The recent election of the American Fern Society resulted in the reelection of the old officers: R. A. Ware, president; Nellie Mirick, vice president; L. S. Hopkins, secretary; H. G. Rugg, treasurer.

L. S. Hopkins.

INDEX TO VOLUME 2

NOTE.—Species of plants other than ferns are not included in this index. The ferns are listed by their scientific names when these are given.

Acrostichum aureum, 39, 40, 75, 102; excelsum, 17
Adiantum, 44: bellum, 16, 18; bellum walsingense, 17; capillus-veneris, 14, 39; cristatum, 81; denticulatum, 44; fragile, 38, 102; Jordani, 15; obliquum, 44; pedatum, 89. 111, 114; pedatum laciniatum, 115; tenerum, 17, 39, 81, 102; villosum, 102
Alsophila, 45: quadripinnata, 81
Aneimia adiantifolia, 5, 75
Anopteris heterophylla, 18
Another station in central Vermont for Dryopteris filix-mas and for the new hybrid filix-mas × marginalis, 93
Antrophyum, 44
Aspidium marginale, 23; spinulosum, 23
Asplenium angustifolium, 86; cuneatum, 44; dentatum, 18, 39, 40, 75; ebeneum Hortonae, 86; ebenoides, 24, 84, 85; erosum, 81; filix-femina, 86, 87, 114; filix-femina polyclados, 87; formosum, 81; montanum, 93; muticum, 18; pinnatifidum, 93: platyneuron, 24, 86: platyneuron incisum, 86; platyneuron serratum, 86; rectangulare, 81; rhizophorum, 81; ruta-muraria, 86, 93; ruta-muraria × trichomanes, 18; serratum, 44; trichomanes, 18, 86; vespertinum, 122; viride, 85
Asplenium ebenoides, A new locality for, 24
Azolla filiculoides, 109
BENEDICT, R. C. Carl Frederik Albert Christensen: some biographical notes, 53
Bermuda ferns, Random notes on, 16
Bigelow, H. C., some hybrid ferns collected by, 63
Birdfoot fern, 122
BISSELL, C. H. A new locality for Asplenium ebenoides, 24
Blechnum occidentale, 9, 10, 40, 102; serrulatum, 40, 75
Botrychium dissectum, 92, 115; lanceolatum angustisegmentum, 92; lunaria, 92, 115; obliquum, 92; obliquum elongatum, 92; obliquum oneidense, 92; ramosum, 92; simplex, 92; ternatum, 92; virginianum, 92
Camptosorus rhizophyllus, 24, 84
Campyloneurum angustifolium, 81; cubense, 81
Ceratopteris deltoidea, 39
Ceropteris, 44; calomelaena, 38, 81, 102; sulphurea, 39, 102
Cheilanthes, 42, 75, 81, 122: Cooperae, 15; Fendleri, 15, 111; gracillima, 15, 111, 114; lanosa, 93; microphylla, 102; myriophylla, 114; viscida, 14
Christensen, Carl Frederik Albert: some biographical notes, 53
Chrysodium vulgare, 102
Cliffbrake, slender, 119–121
Coffee fern, 122
Colorado Desert for ferns, The, 12
Connecticut, Some hybrid ferns in, 63
CORNE, F. E. Another station in central Vermont for Dryopteris filix-mas and for the new hybrid filix-mas × marginalis, 93
Cryptogramma acrostichoides, 112–114; Stelleri, 91
Cyathea arborea, 39–41, 45, PLATE 2, facing 33; crassa, 71; portoricensis, 45; Tussacii, 81
Cyclopeltis semicordata, 40
Cystopteris bulbifera, 91; fragilis, 91, 122; fragilis cristata, 115
Danaea nodosa, 44
DARLING, N. Observations on

some Lycopodiums of Hartland, Vt., 49
Davallia dissecta, 122
Dennstaedtia adiantoides, 39; punctilobula, 91; punctilobula cristata, 91; punctilobula schizophylla, 91
Dicranopteris 81: bifida, 22, 44; orthoclada, 22; Wilhamsii, 21, 22
Diplazium Urbani, 81
DOWELL, PH. (Editor's note, 63) Some literature on North American ferns, 27: A suggestion on the field study of ferns, 123
Dryopteris, 44, 54, 63, 102, 116: bermudiana, 18: Boottii, 55, 63, 89, 116; Clintoniana, 89, 115; Clintoniana × Goldiana, 63: Clintoniana × intermedia, 63: Clintoniana × spinulosa, 63, 115: cristata, 89; cristata × Goldiana, 63, 83, 115; cristata × intermedia, 63, 116; cristata × marginalis, 63; cristata × spinulosa, 55, 63, 116; dilatata, 116; filix-mas, 83, 93–95, 124: filix-mas × marginalis, 93-95; fragrans, 87, 88; Goldiana, 86, 89, 94: Goldiana × intermedia, 63; Goldiana × spinulosa, 83; intermedia, 89; intermedia × marginalis, 63, 116; marginalis, 83, 94; marginalis elegans, 116; marginalis × spinulosa, 86; patens, 6, 18; pittsfordensis, 86; radicans, 44; reptans, 81; rigida arguta, 15, 110, 114; sancta, 81; serra, 81; simulata, 87; Speluncae, 18; spinulosa, 89; spinulosa anadenia, 89; spinulosa concordiana, 89; spinulosa dilatata, 89, 116: tetragona, 81, 102; thelypteris, 6, 17
Dryopteris filix-mas and the new hybrid filix-mas × marginalis, Another station in central Vermont for, 93
Elaphoglossum, 42; apodum, 44
Equisetum fluviatile, 117; hiemale, 117: hiemale affine, 117; hiemale intermedium, 117; laevigatum, 117; pratense, 116; sylvaticum, 116: telmateia, 15
Eschatogramme furcata, 81
Fadyenia prolifera, 45
Fern flora of Ohio, Further notes on the, 115
Fern from Panama, A new, 21
Fern lover's paradise, Vermont, the, 83
Fern protection, A plea for, 22
Ferns in Connecticut, Some hybrid, 63
Ferns, Random notes on Bermuda, 15
Ferns, The Colorado Desert for, 12
Filix fragilis, 112–114
Florida Keys, The, 1
Further notes on the fern flora of Ohio, 115
Gold-back fern, 122
Goniophlebium chnoodes, 81
Gymnogramma triangularis, 109; triangularis viscosa, 109
Gymnopteris triangularis, 13
Haiti, 65
Hartland, Vt., Observations on some Lycopodiums of, 49
Hawaiian fern, A new name for a, 19
Hemionitis palmata, 39, 102
Hemitelia horrida, 41, 45
Hispaniola, 65
HOPKINS, L. S. Lycopodium selago from Ohio, 46; Further notes on the fern flora of Ohio, 115; [Contributions to the society herbarium, 124]
Hybrid ferns in Connecticut, Some, 63
Hymenophyllum lineare, 44; polyanthum, 44
Letter to the members of the American Fern Society, 58
Literature on North American Ferns, 1911, Some, 27
Lycopodium, 46–53; complanatum, 51, 52; complanatum flabelliforme, 52; inundatum, 117; lucidulum, 118, 119; porophilum, 46, 117; sabinaefolium, 49–51; selago, 46–49, 118, 119; tristachyum, 49–52
Lycopodium selago from Ohio, 46
Lycopodiums of Hartland, Vt., Observations on some, 49
Lygodium oligostachyum, 71; palmatum, 22, 92

Maidenhair, 122
Marsilea quadrifolia, 119
Matteuccia struthiopteris, 91
MAXON, W. R. A new name for a Hawaiian fern, 19; A new fern from Panama, 21
Meniscium reticulatum, 81
Moonwort, Onondaga, 119, 120
Naturalist afloat, Notes of a, 1, 33, 65, 97
Nephrolepis biserrata, 102; exaltata, 5, 18, 102
New fern from Panama, A, 21
New locality for Asplenium ebenoides, A, 24
New name for a Hawaiian fern, A, 19
Notes and news, 25, 64, 96, 124
Notes of a naturalist afloat, 1, 33, 65, 97
Notes on Bermuda ferns, Random, 16
Notholaena, 42; cretacea, 13; Newberryi, 13, 15; Parryi, 13
Observations on some Lycopodiums of Hartland, Vt., 49
Odontosoria dumosa, 40
Ohio, Further notes on the fern flora of, 115
Ohio, Lycopodium selago from, 46
Onoclea sensibilis, 91
Onondaga moonwort, 119, 120
Onondaga moonwort and slender cliffbrake, Outings for, 119
Ophioglossum palmatum, 44; vulgatum, 92
Osmunda cinnamomea, 17; cinnamomea auriculata, 115; cinnamomea frondosa, 17, 92; Claytoniana dubia, 91; regalis, 17; regalis orbiculata, 91
Outings for Onondaga moonwort and slender cliffbrake, 119
Paltonium lanceolatum, 6, 81
Panama, A new fern from, 21
Pellaea andromedifolia, 15; atropurpurea, 90; brachyptera, 113; Bridgesii, 112, 114; densa, 109, 112, 114; ornithopus, 15, 109–111, 114; ornithopus-Wrightiana, 113; Wrightiana, 114
PEMBER, F. T. The Colorado Desert for ferns, 12
Phegopteris dryopteris, 89; hexagonoptera, 89; phegopteris, 89
PHELPS, O. P. A plea for fern protection, 22
Phlebodium aureum, 81
Phymatodes exiguum, 6
Plea for fern protection, A, 22
Polypodium, 122; aureum, 39, 44, 102; californicum, 15, 112; crassifolium, 39; elongatum, 81; incanum, 102; minimum, 19; phyllitidis, 6, 102; plumula, 18; polypodioides, 6, 102; **Saffordii,** 19, 20; Scouleri, 15; serpens, 102; serrulatum, 20, 44; Swartzii, 6, 102; trifurcatum, 44; vulgare, 89, 112
Polystichum acrostichoides, 23, 87; Braunii, 87, 94; munitum, 15, 111, 114; munitum inciso-serratum, 15
Porto Rico, 33
Psilotum nudum, 18
Pteridium, 81; aquilinum, 14, 114; aquilinum pubescens, 110; caudatum, 17
Pteris aquilina, 6, 89, 124; aquilina pseudocaudata, 89; caudata, 5; longifolia, 5, 17, 18, 102
Random notes on Bermuda ferns, 16
RANSIER, H. E. Outings for Onondaga moonwort and slender cliffbrake, 119
Rhipidopteris peltata, 44
Rhizophora mangle (mangrove), 7, FIG. facing 8
Roughing it to the Yosemite, 107
RUGG, H. G. Random notes on Bermuda ferns, 16; Vermont, the fern lover's paradise, 83; Whittier's herbarium, 121. [Miss Corne's station for Dryopteris filix-mas, 124; common brake as greens, 124]
SAFFORD, W. E. Notes of a naturalist afloat, 1, 33, 65, 97
Salvinia natans, 17
Santa Cruz, 97
Santo Domingo, 65
Selaginella apus, 119; Bigelovii, 15; rupestris, 119
Silver-back fern, 111, 122
Slender cliffbrake, 119–121

Slender cliffbrake, Outings for Onondago moonwort and, 119
Some hybrid ferns in Connecticut, 63
Some literature on North American ferns 1911, 27
Struthiopteris polypodioides, 81
Suggestion on the field study of ferns, A, 123
Tectaria heracleifolia, 81; plantaginea, 44; trifoliata, 44
The Colorado Desert for ferns, 12
TRACY, H. H. Roughing it to the Yosemite, 107
Trichomanes, 42, 44, 81; membranaceum, 44; scandens, 81
Vermont, the fern lover's paradise, 81
WARE, R. A. Letter to the members of the American Fern Society, 58
Whittier's herbarium, 121
WINSLOW, E. J. Some hybrid ferns in Connecticut, 63
Woodsia alpina, 90, 91; alpina Belli, 91; glabella, 85, 90; ilvensis, 90; obtusa, 90; scopulina, 113, 114
Woodwardia areolata, 91, 93; radicans, 109, 110; spinulosa, 15; virginica, 17, 91
Xiphoptēris serrulata, 81
Yosemite, Roughing it to the, 107

ERRATA

P. 23, last line, for SAILSBURY read SALISBURY.
P. 63, line 13, *for* Plainvllle *read* Plainville.
P. 64, line 15, *for* Herbanium *read* Herbarium.

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